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Original Contributions.

HOW TO MAKE GOLD FILLINGS.

BY J. V. CONZETT, D.D.S., DUBUQUE, IOWA.

(Continued from page 807)

A good separation is a prerequisite to success in making any kind of a filling and is essential in making a gold filling. The separation may be obtained in several ways, and the choice of means rests with the operator, and he will choose the method that is indicated for the case in hand. The teeth may be separated in advance, which is the method I usually employ, or they may be separated immediately by one of the many separators upon the market, or by the method of condensing the gold against the approximating tooth, a method that is particularly favored by the writer, and will be explained later. If the previous method is adopted the patient is instructed to call a day or two in advance of the operation and a separating medium placed between the teeth. While there are several substances that may be used, rubber is not one of them. I know that it has been used extensively in the past and is used by some operators at present, but it should have no place in any dentist's cabinet, for it is a most barbarous method, inflicting needless pain upon the patient and often causing irreparable damage by slipping up into the soft tissues and setting up an inflammation that is sometimes very difficult to eradicate. But even though it does not cause trouble by slipping up into the gums, it makes the teeth excruciatingly tender and renders them unfit to operate upon, and if the operation is made in spite of the soreness the patient is made to suffer tenfold more pain than would be necessary. Cotton tied into place with a piece of floss silk, waxed tape, guttapercha forced into the cavity, or ordinary cotton twine may be used, and all will give satisfactory results and will not cause the teeth to become sore.

I prefer to use the cotton twine in a manner taught me by Dr. Bogue of New York. A piece of floss silk is doubled and passed between the teeth and between the loop made by the doubled silk a piece of ordinary cotton twine that has been previously sterilized is passed into the loop; this is drawn through the loop and we have a loop of the twine and a loop of the silk held together as two links of a chain; the silk is now drawn back through the teeth, pulling the cotton twine with it. When the loop of twine appears through the teeth, one end of the silk is dropped and the silk is pulled out of the twine and thrown away. The silk is only used to facilitate the drawing of the double cotton twine between the teeth.. If there is room to get the twine in without using the silk, it is of course not necessary to use it. The twine is now between the teeth with the loop toward the labial and the open ends toward the lingual surfaces of the teeth. One end of the twine is now grasped between the fingers, brought over the incisal surfaces of the teeth and slipped in between the loop, the other end is taken and the two ends united into a knot; as the knot is drawn tight the loop and the knot working toward each other cause the teeth to spread apart. A number of knots may be made as tightly as may seem advisable and the patient dismissed until the appointment for the filling. This method when learned is very easy for both patient and operator and causes as much separation as one may desire, for the thickness of the twine and the number of knots made can be suited to the case. When properly inserted it is very rare to have one of these separations come out before the operation. In some cases where there has been extensive decay we will find that the teeth have so fallen together that it will take a long time to obtain the necessary separation. In these cases it is well to open up the cavity, remove the decay and pack the cavity full of guttapercha; the chewing upon this will cause it to spread and gradually force the teeth apart. In some cases it may be necessary to renew the guttapercha several times and wait for a period of several months before a satisfactory condition is obtained, but it always pays to take the time and the trouble in these cases, for the comfort that the patient will obtain through a proper restoration of contour and interproximal space will more than pay for the time

and expense. In some cases it is justifiable to place the immediate separator between the teeth, screw it up as far as possible and then pack in the guttapercha and dismiss. This may be repeated later if necessary until the necessary space is obtained. This method is the more painful, but greatly expedites matters, and in case of haste is indicated as good practice. In those cases in which it is not possible to obtain previous separation, immediate separation is indicated. I know that many very good operators prefer this method, and I have no quarrel with them for it. Every man must choose the methods and the means that bring him the greatest success, but I only use the immediate separation when it is not possible to obtain previous separation.

There are two ways of obtaining immediate separation. The first by using any one of the many separators upon the market. There are many very good ones, but the Perry set is the one that seems to cover requirements best in my practice. However, I use an immediate separator very rarely, because I dislike to inflict the pain of immediate separation upon my patient, and also because I cannot but feel that the force necessary to use in separating teeth that are firmly imbedded in the alveolar process and applied by steel bars is not the best thing in the world for the enamel rods, particularly if the cavity is cut anywhere near the insertion of the separator, which is nearly always the case. I know that those who use the separators contend that they hold the teeth firmly in place and that the stress of the mallet is not felt as much as when the separator is not used; but, while this is true, the teeth can be held just as firmly and immediate separation obtained just as surely by the method which is used in my practice wherever it is necessary to use immediate separation, and when *any* method of immediate separation will produce the results. And that is by simply building your contact against the approximating tooth, and then as you build occlusally always mallet strongly between your contact and the approximating tooth. With each pellet that you force in between them you force your teeth farther apart until you have gained the space necessary to properly restore your contact and interproximal space. As soon as you have built your gold over to contact you have steadied your tooth and the mallet shock is eliminated. I have demon-

strated this method so frequently at clinics and in my own practice that I know it is successful and therefore I have little use for the immediate separator, which for me is very much in the way.

But why is separation necessary at all? First, and I want to emphasize this very strongly, to obtain the original contour of the tooth, *and to obtain a proper interproximal space.* The interproximal space differs in different individuals, according to the shape of the teeth. Teeth with large bell-shaped crowns have a large interproximal space and a small contact point. Teeth that are more cubical in shape with large flat contacts have comparatively small spaces. But between all normal teeth there are well defined interproximal spaces, and when these spaces are destroyed by the decay of the teeth and consequent falling together of the approximating teeth, gum festoons that normally fill the spaces are crowded out, food crowds in between the teeth, and in a short space of time a pyorrhea pocket is formed that will soon menace the life of the tooth. In these cases if the proper separation is obtained and the teeth perfectly contoured the interproximal space will have been reproduced and the gum will come up into the space and a healthy condition is nearly always maintained. But if the teeth are filled without a proper separation there will of necessity be large flat contact surfaces and practically no interproximal space, the food will continue to crowd in between the teeth, down below the gingival margin and a beautiful pus pocket will be the result. I see so many cases of this kind and patients are consulting me so often for the correction of just such conditions that I feel it cannot be emphasized too strongly.

Allow me to give you just one illustration out of very many. A gentleman presented with a right, upper, second bicuspid very loose and sore. Upon examination I found that there was practically no connection with the alveolar process and so had to remove it. Inasmuch as there was no evidence of pyorrhea in any other place in the patient's mouth, I inquired concerning the history of this particular tooth and elicited the following story: He said that the tooth had a small cavity on the distal surface and he went to a dentist, who inserted an amalgam filling. He immediately began to have trouble with food packing in between the teeth and impinging upon the gums, therefore he went back

to the dentist, who took a separating file and cut in between the teeth, making a still flatter surface and less of an interproximal space. This not sufficing, for matters grew worse, the act was repeated several times until there was no space left, the gingival margins of the teeth being in contact and a beautiful Arthur separation between the teeth. Finally matters got so bad that the patient came to me for relief, but too late to save the tooth. I do not care how well a tooth may be filled, or how well the filling may be preserving the tooth from caries, if that tooth is not properly contoured, has not a small contact point properly placed, and therefore has not the normal interproximal space properly reproduced, I consider that filling a failure. It will not save the tooth, as this, eventually, will be lost through pyorrhea, and it will be a source of discomfort to the patient as long as it does last.

And, secondly, to maintain normal occlusion, and that means a good deal. Dr. Brady once said to the writer: "If we had the perfect orthodontist, the perfect prosthodontist, and the perfect operative dentist, we would then have the perfect occlusionist." We are in the habit of expecting the orthodontist and the prosthodontist to be well-versed in the science of occlusion, but the operative dentist in the past has thought that occlusion was of little importance to him. Not so; it is of the utmost importance to the permanence of his work, as I have tried to point out, but more than that, it is of importance from the standpoint of comfort to the patient and the ability to properly use his dental organs. We frequently find cases in which there are cavities between every tooth in the upper jaw, and perhaps many between the bicuspids and molars of the lower jaw. Now if in each of those cavities we fail to reproduce the normal contour by only .5 millimeter, that will make a full millimeter between each tooth, and when we multiply that by ten to sixteen teeth you can begin to understand the havoc made in the relation of the teeth one to the other occlusally, and I assure you that the picture is not overdrawn, and if you will carefully examine the cases that come into your office with this in mind you will bear me out in the assertion that the *most important* thing in the filling of teeth is the reproduction of the proper contact and interproximal space. I consider it good practice to remove a filling that is perfect in

every other way if it is not made so that the tooth is able to take its proper place in the arch and perform its proper function; and it is not able to do that if its occlusal surface has lost from two to six millimeters of masticatory surface, to say nothing of the havoc being wrought at the gingival margin. More than that, I consider it good practice to cut into perfectly sound teeth and build out a normal contact point in those cases where the contact points have worn down into a broad facet and food is able to crowd in between the teeth and into the interproximal space to the great discomfort of the patient.

(*To be continued.*)

VALUABLE SUGGESTIONS FOR SOCIETY WORKERS.

BY M. L. CHRISTENSEN, D.D.S., OSHKOSH, WIS. PRESIDENT'S ADDRESS, READ BEFORE THE FOX RIVER VALLEY DENTAL SOCIETY, AT OSHKOSH, WIS., MARCH 10, 1908.

It is with the most sincere pleasure that I extend to you all, each and every one, a hearty welcome to our city, and trust that you may each take away with you not only pleasant memories of this day but profitable ones as well.

In the briet remarks that I make to you at this time I wish to discuss the best interests of our society, as its prosperity and growth affects us all, in that it makes us better practitioners and more valuable components of a community. Many of the advances made by the profession of dentistry have been accomplished largely through the efforts of such organizations.

Even though our organization dates back only four years, it has experienced a remarkably healthy and rapid growth.

This condition has been brought about by a unity of purpose among our membership in advancing the profession of dentistry in our own immediate vicinity. The harmony prevailing is a source of deep satisfaction. The bond of fraternity is strengthened and cemented by these semiannual gatherings, thereby allowing each member the privilege of becoming personally acquainted with every other member. There is no friendship so deep or permanent as that which springs from common interests. This friendship, in a great measure, overcomes the natural diffidence

of some who would otherwise hesitate in taking a part in the discussions, clinics or general work of the meetings.

A young man just entering upon a practice is sometimes discouraged upon his first attendance at a dental meeting. He may have few, if any, acquaintances at this time, and the fraternal spirit has not yet reached him, and he half resolves not to go again. We know not what his ability or helpfulness to us as a society may be. His mind may be just the one to stimulate and quicken ours. Carlyle tells us that "each new epoch in his life began with the acquaintance of some great man." If we would not miss our opportunities, let each one already in the society make it a point to interest the new member, according him a hearty welcome, making him feel that he is one of us from his initial meeting, as we never know the uplift he may give until he is accorded the chance.

We may be prejudiced, and perhaps rightly, against certain members of our profession who seem utterly indifferent to any of our dental societies or a code of ethics. This indifference may come from lack of early training, opportunity and environment. True, such a one is the loser and is surely being relegated to the rear, as the people now place a much higher value on their dental organs than they did only a few years ago. More is demanded of us as dentists. We must first be ethical, up-to-date in every sense of the word, and well-rounded, useful citizens as well as the best of dentists.

If we are dissatisfied with the estimation which the public places on dentists as scientific or professional men, on account of unethical practitioners, it is quite obvious that each member should loyally support this society, not only by taking an active part in its proceedings but by repeated personal appeal enlist the cooperation of every dentist in his immediate vicinity. If he is not eligible, endeavor to make him so by every influence you may exert.

We have all spent years in our college course, and now that we do not have the daily inspiration of meeting instructors, men who are in the forefront of scientific investigation, I, for one, surely feel the need of our meetings and the helpful suggestions, practical experiences related, and little hints dropped, perhaps

unconsciously, by members, which as I hear them I wonder if my wits have been wool gathering not to have discovered them myself. To my mind it seems practically impossible for us as practitioners to produce the best results without the personal contact of meeting each other in society work. No matter how energetic a student one may be, we need the interchange of ideas and the enthusiasm we gather from coming together and hearing the bright discussions and imbibing the genuine spirit of goodfellowship.

At the same time, do not misunderstand me, I would not minimize the work of the dental journals. No man is just to himself or patients who does not take at least two or three good ones and absorb the good in them.

Throughout all time this law has been repeated, "we become like those we habitually admire." In this society are members possessed of upright character and professional attainment, and we consciously and unconsciously acquire a degree of these attributes.

This, however, does not come about simply through admiration. It is a pleasure to watch a good game of tennis, see the ten pins go down in the bowling alley, or listen to a spirited debate. We may look, listen and applaud, but how much muscle, training or alertness have we ourselves received as mere onlookers? We must do the thing ourselves if we would grow in strength. Thus it appears that we must all be workers to grow and develop, and in time it becomes a habit. Let us strive to make our society ideal in this respect, keeping this idea in mind: "The business of life is the mastery of the art of living smoothly and justly with one's fellows and the acquisition of skill in calling out the best qualities of those about us."

Our State society is in process of reorganization similar to the Illinois society. With this in view, let us put forth our best efforts to make ours a worthy adjunct of it.

In this connection we might speak of our much-discussed dental laws. We are all conscious that our dental laws are unjust, in that they do not provide an interchange of dental licenses with other states. We had a striking illustration of this when the disaster at San Francisco took place. There hundreds of dentists were practically thrown on the world, as California was not large

enough to absorb them all. We may think ourselves and families secure from molestation by disease or any other calamity, but we have no assurance of this, and if we had, let us not be so narrow as to overlook some exceptions who may be less fortunate.

We think ourselves a liberal profession, but the dental laws which we allow to stand on our statute books prove the reverse. Would not a dental law similar to that of Iowa be a step in the way of justice to the dentist who may wish, or be compelled to change his residence to some other state?

To some who may not be familiar with this amendment, it is briefly this. It requires that the state from which the applicant shall come shall have and maintain equal standards of laws regulating the practice of dentistry, and certificates of removal are issued from this state and they accept the same from the Iowa Board of Dental Examiners.

It is a fact which we must face, we cannot dodge it, that few of us are prepared to earn our livelihood along other lines after practicing fifteen or twenty years. If we were compelled to take up other work we would find it difficult to master the details of another avocation and make a success of it. Very few of us would be able to pass as creditable a theoretical examination after having been in active practice for a number of years as we would when fresh from college, and yet it must be admitted that we are of more service to our patients than when this same college training was perfectly fresh in our minds. We here all know that this same college training is necessary, even though some of the technicalities escape us as the years go by, yet we gain in practical knowledge.

Our society might have a standing committee to report on any advancement or new laws made by the different states for the betterment of this condition. Then it could be presented to the State Society and they in turn bring the matter before the legislature, and in time a definite result might be accomplished.

Before closing I wish to thank you for the confidence placed in me by electing me as your president for this year. My best energies are yours. I shall try to do my work conscientiously, and whatever discrepancies you may note in the performance of the same will, I trust, be viewed with leniency.

I also wish to express my appreciation of the faithful and able work done by the secretary and the various committees who had this meeting in charge and those participating in the program. They have prepared such a feast of good things for us it is with pleasure that I resign in their favor.

REPORT OF A CASE OF FRACTURE OF BOTH SUPERIOR AND INFERIOR MAXILLARY BONES.

BY GEO. A. STRATTON, D.D.S. READ BEFORE THE FOX RIVER VALLEY DENTAL SOCIETY, AT OSHKOSH, WIS., MARCH 10, 1908.

In writing this paper it is not my purpose to give you a description of any new method of reducing fractures, or any new appliance for retaining the same. It is merely an account of my experience with a particularly disagreeable case with the hope that in the discussion some points of interest to all of us may be brought out. I undertook this case in somewhat the position of an amateur, it being my second experience in fracture work and my first case was a trivial one.

The patient was a young man about nineteen years of age, a farmer, of the usual vigor and good health enjoyed by that class of people. The accident happened while he was hitching up a nervous horse, the horse kicking him at close range on the left side of the face. The calk on the shoe struck his cheek about on a level with the line of occlusion of the teeth. I will enumerate his injuries as nearly as it was possible for me to trace them. There was, first, a cut from the corner of the mouth to the angle of the jaw about five inches long, a broken nose, five teeth missing from the right central to the left second molar. This was where the first fracture was noticed. Where the teeth were kicked out the superior maxillary bone anterior to the second molar was split in two parts, leaving an opening into the antrum of Highmore into which one might put his little finger. The palatal fragment was pushed over toward the right side to within a half inch of the teeth on that side. This fragment was in some manner tightly wedged between the other bones so that it was almost impossible to move it. The alveolar process on the buccal side of the missing teeth suffered an oblique fracture, leaving it hang-

ing only by the gums. The remaining second and third molars on the left side were also on a fractured fragment and could be moved about at will. To conclude with the superior maxillary, the entire right maxillary bone, including the seven teeth, was broken from its facial attachment and was quite movable. This was enough to discourage me, but there was one more break, the unkindest of all to me. The inferior maxillary was fractured obliquely at the angle on the left side, drawing the chin considerably to the left. At the time I first saw this case the patient was in the hospital under the care of a physician and it was three days after the accident. The patient had had little done for him except to have the cut on the face sewed up and the broken nose set. His face was swollen as round as a ball. He was in great pain. The odor from the mouth was nauseating and considerable pus was coming therefrom. It was impossible for me, at that time, to ascertain the extent of his injuries. I at once, however, instituted a system of mouth-washing every fifteen minutes with a hot borolyptol solution. I will never forget my surprise at the first washing to see the solution come out of the patient's nose and also run into his throat. Any attempt at palpation brought forth shrieks and a profuse hemorrhage from mouth and nose. The next morning a thorough examination was made and reduction of the fracture attempted, but with little or no result. The superior maxillary was so badly splintered that it was impossible to make the bones stay in place. When one was pulled to position another slipped out. Wiring seemed impossible because, when attempted, the upper teeth were all drawn down and to the left side with the inferior maxillary. My only hope seemed to be a splint, and this I determined to make. Nothing more could be done the first morning, because the patient was completely exhausted. The pain was certainly terrific. The physician and myself were on hand early the second morning and I proceeded to take the impression, but it was easier said than done. When the mouth was opened the bone of the superior maxillary would drop down to such an extent that a tray could not be placed in the mouth. Finally impressions were obtained in modeling compound by tieing ligatures on the upper second molars and passing them upward and backward from the corners of the

mouth and thereby holding up the loose fragments. Then the palatal portion of the mouth was filled with modeling compound and a tray with the rim partially removed and containing a small proportion of softened modeling compound was used for the complete impression of the teeth. After it was thoroughly cooled and removed we had a crude but fairly accurate impression. The lower was obtained without difficulty. The splint was made by sawing the upper model on a line from the median line to a point a little to the left of the posterior nasal spine. It was then placed in as nearly the normal position as I could possibly arrange it, placed in occlusion with the lower and mounted in the articulator. A wax model was then made for a splint and the rude one which I pass around vulcanized from same. You will readily see without much examination that I am not much of a splint-maker. But for all that, it was quite accurate. The next morning we went to the hospital and proceeded to place the splint in position. It went into the upper mouth nicely, and then I tried to get the lower teeth into place. I tied wires to the lower anterior teeth, twisting them to loop, and attempted to pull to place by putting a stick through the loop of wire and pulling, corkscrew fashion. It took my entire strength to get it into place. When I did get it in the results were very satisfactory as far as facial relations and occlusion were concerned, but it would not stay in place. The patient said that it hurt, and I have no doubt but that it did. Anyway, we could not bandage his jaw tight enough to make the teeth stay in the splint for more than fifteen minutes. I do not know how to account for my failure to make the teeth stay in the splint, unless the muscles had become so stiff that it was impossible for the patient to relax them. I neglected to state that the physicians decided that it was impractical to give the patient a general anesthetic, and while the attempt to adjust the splint was being made the patient was under the influence of a general analgesic, hypodermically injected, and the pain was materially lessened; but the patient was not completely anesthetized. My chagrin at not being able to use the splint, however, was somewhat lessened by the result finally obtained. At this time the swelling was considerably reduced by the constant syringing, and

wiring was again resorted to. It was decided to pay no attention to the occlusion on the left side and arrange the right as well as possible, which was done. All the teeth on the right side were drawn down bodily and wired firmly to the teeth on the lower right side. This drew the upper right fragment down and inward a space of nearly half an inch. Next a lead splint approximately fitting the outside of the inferior maxillary was constructed and placed in position. Then by tightly bandaging from left to right the inferior maxilla was drawn partially to place. I was somewhat in doubt as to whether union would occur in this position, but it did, and uneventfully, too. The bandages were removed in three weeks and the results were good. By the growth of a beard I am sure no one would be able to detect any deformity from external observation. Considerable and severe necrosis was found in the upper mouth after the removal of the bandages, but this was easily cured by the removal of several small sequestra of bone and the liberal injection of chemically pure lactic acid into all pus pockets. The occlusion on the right side is as good as it ever was and that on the left is very fair. As I think back to the time when I was working on the case, it occurs to me that silver wire sutures in the inferior maxillary where it was fractured at the angle would have made everything very simple, as it would be easy to wire the upper teeth to the lower when one or the other is in normal position. However, when physicians deem it impracticable to administer an anesthetic, what can one do? I found the literature on fractures of the maxillary bones very meager and found no mention at all of any method of reducing fractures of both jaws. When no specialist is at hand it would seem that some appliance should be in existence by which the country practitioner might cope with the severe cases which frequently come to him. The patient, the last time I saw him, was in good condition. The bones were very firm and mastication was easily performed. The only untoward result was considerable stenosis of the left nostril, which showed that the turbinates must have been crushed also. Before discharging the patient several thorough prophylactic treatments were given the teeth, with the result that the consequent pyorrheal condition was entirely removed.

SODIUM DIOXID.

BY E. M. SOULE, D.D.S., UNITY, MAINE.

Some four years ago, in the *Items of Interest,* I published my observations on the effect of sodium dioxid as an obtundent of sensitive dentin. Since that time I have noted the reports of sundry observers whose experiences confirm my own—that it is without doubt valuable in such cases.

Its value, however, is not confined to the bleaching of teeth, disinfecting of canals and obtunding sensitive dentin. I find it most useful in those cases where a large cavity has become filled with hypertrophied tissue, which usually is hard to differentiate between gum and pulp tissue, and which ordinarily calls for pressure by guttapercha or the lancet to remove. Either of these processes is attended with more or less pain and bleeding. By using the sodium dioxid with the care due an escharotic whose action is so hard to limit these growths may be removed speedily, almost painlessly, and without bleeding. My method is to dip a small piece of cotton into some of the powder on a slab, carry it to the affected tissue, which is protected by a cotton roll on each side, cover with a large piece of cotton and wait some few minutes, holding to place. Then remove, syringe with a large amount of water and repeat until the growth is gone. I have seen no bad results whatever following this method when used with the discrimination necessary while handling so powerful a drug. Another use is in those cases where the pulp has lost nearly all its vitality from severe inflammation but still is too sensitive to drill out and septic enough to cause danger if pressure anesthesia is used.

A small drill is passed into the pulp chamber if no opening exists, a particle of the powder put in and worked gently around the bottom of the hole thus made, and the pulp chamber can gradually be enlarged by burs, using the Na_2O_2 when necessary, with a minimum of pain and no danger of infecting the pulp and canals with the instruments used, and the drills will cut faster and cleaner.

[Sodium dioxid is a most valuable agent if used as Dr. Soule suggests. There are many conditions in dental therapeutics where

no other agent will answer the purpose so well. It should never be used, however, especially without the dam, unless the operator has vinegar or a weak solution of acetic acid at hand to neutralize its action on soft tissue.—Editor DENTAL DIGEST.

PORCELAIN VS. SILICATES.—I believe that many of us are using the silicate cement fillings, where we should really use the porcelain inlay. I have no doubt but that we are prone to so employ them because they are so much more convenient and rapid to insert in the cavities. As for myself, I am wedded to the porcelain inlay, and am putting in as many today as I have ever done. It is said that the porcelain inlays are going out. Not by any means. They are not going out. They will stand the stress of mastication in many cases where we do not know that the silicate cement will. I have had failures with the silicate cement fillings, although very few, indeed.—J. D. PATTERSON, *Western Dental Journal.*

ELECTRICITY AS AN ANESTHETIC.—Before a gathering of homeopathic physicians in Flower Hospital, New York, Dr. William H. King, dean of the Homeopathic college, subjected a dog to an electric current to demonstrate that electricity can be used successfully in place of ether or chloroform as an anesthetic. Dr. William H. Dieffenbach assisted Dr. King.

Dr. King and Dr. Dieffenbach got a black-and-tan terrier in good health, shaved the hair off the top of his head and his back near the tail above the lumbar region. One electrode was placed on the head and the other on the back and an intermittent current of a little more than six volts was turned on. The current was from the regular street supply, modified in the specially constructed apparatus used. In forty-five seconds the dog was unconscious. He could be handled without the least danger of awakening him. No operation was performed.

Of course, the somnolence continued only so long as the electrodes were kept in place. When they were removed the dog almost instantly regained consciousness, was as lively as before the current was turned on and a close examination could not discover the least ill effects. Dr. Dieffenbach said:

"It is the intermittency of the current that produces the somnolence which makes it possible to perform operations without the least pain to the patient or the least after-effect. It is the after-effect which makes many persons hesitate or refuse to take ether or chloroform. There are no after-effects in the use of the intermittent current and the anesthesia is perfect. A battery could be used in place of the street current. The use of this current in surgical operations will mean a great advance in surgery. Many of the disagreeable features now attending it will be removed, and the patient will be in a better condition to be operated on."—*Chicago Daily News.*

Digests.

THE IMPORTANCE OF MOVING THE ROOTS OF TEETH IN ORTHODONTIA. By Calvin S. Case, D.D.S., M.D., Chicago, Ill. In the year 1882, Dr. J. N. Farrar of New York City published in the *Dental Cosmos*, and subsequently in his work entitled "Irregularities of the Teeth," published in 1888, the "principles and philosophy of lateral movement of crowns and roots of teeth, to close interdental spaces." The mechanical principles involved in root-movements were so perfectly outlined by him that it gives me pleasure at this time to quote him at some length as the basis of my paper:

"In simply moving the crowns of teeth, the apical extremities of the roots of which are already in proper position, the operation should always be based upon that principle of mechanics shown in Fig. 1, which places the fulcrum, F, between the point where the power, P, P, *is* applied, and that of the resistance or weight, W. But, on the contrary, for the lateral movement of roots the power should be applied between the fulcrum, F, and the point of resistance or weight, W, as shown in Fig. 2.

"The four following figures illustrate successive stages in such an operation. The arrows show the direction of the movement of different portions of the teeth at different stages in the operation. P represents a clamp-band; D, D, roots; B, alveolus; F, F, F, places of fulcral bearings; S, direction in which the root is tending; J and L, places of separation between the roots and sockets caused by the operation.

"Fig. 3 illustrates two central incisors standing apart, showing the space between, and Fig. 4, by comparison, shows how the continued use of the same device, after the crowns are brought together, will act differently on the different parts of the teeth and their sockets, by the self-shifting of the fulcrum from a point within the alveolus to the point O, causing the dental leverage to act in the opposite direction.

"Now, if the portion of the septum in Fig. 3 is so hard that it will not easily yield to pressure, and the alveolus about the apices of the roots is soft, a drawing force of the clamp-band of the necks of the teeth would cause the apices of the roots to tend in

the opposite direction, and also cause absorption of the process at the points pressed upon, and a greater separation of the roots. But there is also going on absorption of that portion of the process which constitutes the fulcrum, by pressure of the roots upon it, until the crowns are brought in contact as shown in Fig. 4. The first stage being completed, we enter on the next to bring about parallelism of the roots by causing the apical portions to approach each other. The shifting of the fulcrum to o places the power between the fulcrum and the entire alveolar resistance, thus changing the direction of leverage. When the crowns are brought in con-

Fig. 1.

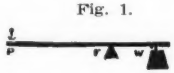


Fig. 2.

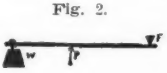


Fig. 3.

Fig. 4.

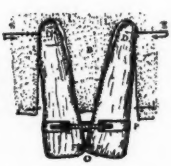


Fig. 5.

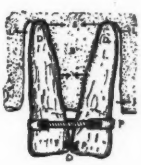


Fig. 6.

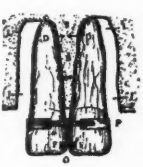
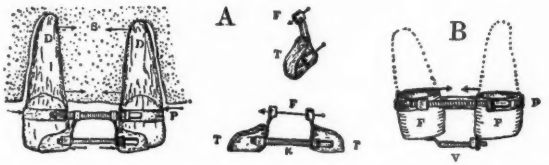


Fig. 7.



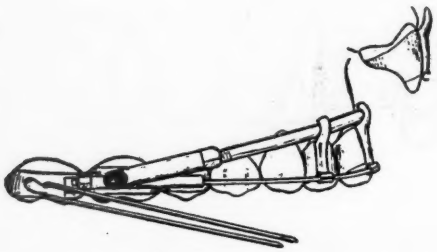
tact at o, and the automatic change in the position of the fulcrum takes place, the power from the same apparatus being continued, the apices of the roots stop their course in the opposite direction and commence to moye in the direction of the applied force.

"Fig. 5 illustrates a later period in the operation, and shows the relative changes in position of the teeth, and also the changes in the shape of the sockets made by continuance of force upon the teeth. Fig. 6 illustrates the appearance at the close of the operation. As here exhibited these figures should be regarded in a conventional sense—as, in fact, no space exists; for, as shown by

Black, as fast as the teeth move from the socket-walls, the fibers of the pericemental membrane stretch, and are interstitially filled by the elements of new tissues.

"As before said, this operation embraces two principles of mechanical philosophy. One is shown when the apices of the roots are moving farther apart, the other when they are nearing. Although apparatus for this indirect operation embraces both principles, the movements of roots toward each other can sometimes be started at the beginning of the operation. This may consist of interchangeable graduated blocks to place between the crowns, but a far more valuable adjustable element is a screw. In Fig. 7, A and B represent two such devices; one is shown as applied to teeth. This consists of a clamp-band, P, screw, K, and two hoods, T, T.

Fig. 8.

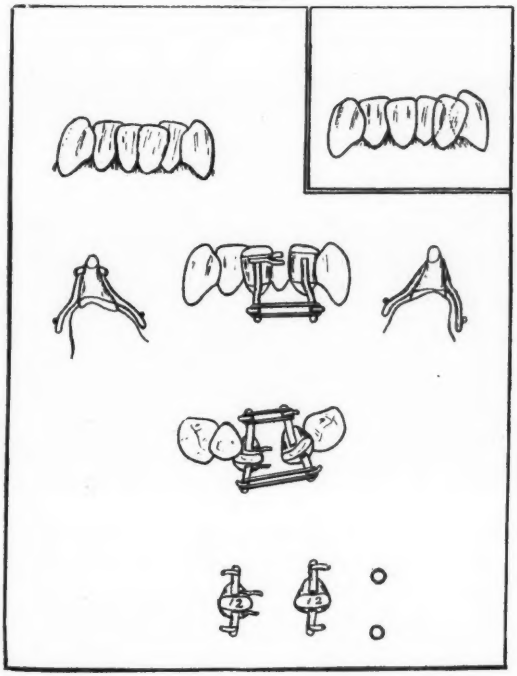


Each of these hoods is suspended on a gold ribbon from a loose ferrule on the bolt of the clamp-band. The other device, B, consists of clamp-band, P, a screw, V, with a loose adjustable nut, and two thimble crowns, F, F, the latter being cemented on the teeth. In operating the mechanism, A, the adjusting screw and the clamp-band bolt are both turned, equally, at the same time. The mechanism, B, is operated by turning the nut (on its screw) the same distance that the clamp-band bolt is turned. By either mechanism the crowns and roots of the teeth move parallel to each other."

In 1893 I presented before the Chicago Dental Society and the Columbian Dental Congress the principles and practical illustrations of the bodily protruding and retruding movements of the front teeth in phalanx for the correction of dentofacial deformities. (See Fig. 8.) At that time I had not seen Dr. Farrar's explana-

tion, as quoted above, nor do I believe that I would have recognized in it the slightest similarity, because the conditions, objects, appliances and results are so different from lateral movements of roots. And yet, as is plain to be seen, the underlying mechanical principles of applied forces are exactly the same. The reason of this is, that all artificial methods which accomplish the movement of the roots of teeth are necessarily the same in their force activi-

Fig. 9.



ties, because they are dependent upon the unchangeable laws of mechanics.

Given similar mechanical conditions, the principles of applied forces for all movements must be the same. The condition in this instance is that which relates to teeth embedded about one-half their length in a yielding bone process having a similar resistance

to movement, and with opportunities limited to attaching the force appliances only upon the exposed portion or crown. Though our devices may differ quite decidedly from each other in appearance, construction and mechanical advantages, the direction and application of forces that produce similar movements must be the same.

The most important mechanical advantage of my device shown in Fig. 8 was that of lengthening the power arm of the lever by applying the force at a point farther rootwise and therefore more nearly opposite to the natural fulcrum in the alveolus. This

Fig. 10.

lessens the need of exerting as much power, and also proportionately reduces the stress upon the artificial fulcrum. It will at once be seen that were it possible to apply the power at any point upon the root of a tooth between the border of the alveolus and its apical portion, a point would be reached where a second or artificial fulcrum force at the occlusal border would not be required to prevent inclination or tipping movement of the crown. Therefore the nearer we approach that point, in the *bodily* movements of teeth, we increase the mechanical advantages of our devices.

In my practice this principle has been considered of the greatest importance in all instances where a bodily movement instead of an inclination movement is desired. It is also of great impor-

tance in the establishment of stationary anchorages to increase the stability of position.

Bodily Lateral Movements of Front Teeth.—In Fig. 9, in which this principle is exhibited, is shown the common and remarkably effective method which I have employed for many years for closing wide spaces between front teeth by the employment of elastic force.

The rootwise bars, of No. 18 wire, are soldered to both the labial and lingual surfaces of wide long-bearing bands. T-spurs are soldered near the ends of these bars for the attachment of small elastic rings. The bars are bent to lie close to the gums, while their length is governed by the muscular attachment of the tissues. If found to be too long they are easily bent away from an irritating position. The possibility of applying the force upon both the labial and lingual aspects enables one to govern rotating move-

Fig. 11.

ment. The guide forks soldered to the occlusal border of one of the bands prevents overlapping when this point of contact becomes the true fulcrum, and during the final truing process of the root-movement—in a similar manner to that which Dr. Farrar pointed out twenty-five years ago.

Fig. 10 shows the common results in my practice of this method of treatment. The teeth are seen to be in proper parallel positions.

Fig. 11 is made from the casts of lower front teeth in the mouth of a man thirty-five years of age. When he presented he had lost a central incisor through absorption of the gum and process from pyorrhea, and the other central was so loose that I picked it out—leaving a wide space in which the process was so absorbed that the gum was dragged away from the necks of adjoining teeth with a considerable exposure of their roots. After

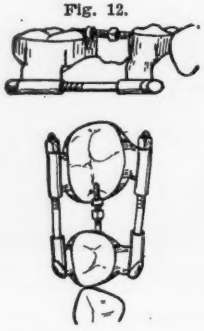
a thorough removal of the salivary and serumal calculi, the apparatus as shown was attached. About one year later the teeth were in the position shown by the final cast. This case, with others, was clinically presented before the Chicago Dental Society in May, 1903, to show "some remarkable movements of teeth for patients older than thirty-five."

The teeth and pericemental tissues of the above case at that time were not only in a healthy condition, but the gums had assumed a nearly normal position, as shown in the illustration.

Bodily Movement of Molar Teeth.—One of the most important demands for the bodily movement of teeth is where it has been found necessary or advisable to extract the first permanent molars instead of the bicuspids in the regulation of teeth.

It applies to those cases of decided unimaxillary and bimaxillary

Fig. 12.



protrusions where the first permanent molars are broken down with decay, while the bicuspids are perfect—one of the common primary causes of which is interrupted development during dentition.

The importance of closing these wide molar spaces need not be told to dentists, who have frequently observed the ill effects of decided mesial inclinations of the crowns of second molars which have followed the loss of the first molars.

The bodily movement of the molar teeth is one of the most difficult operations in orthodontia, unless we except the bodily retruding movement of the roots of cuspids; owing, first, to the limited opportunity of obtaining a firm hold of the crowns of these

teeth for a rigid long-bearing attachment of the appliances; second, to the great resistance to bodily movement presented by the two or three roots of the molars, and the long roots of the cuspids; and third, to the fact that these movements are purely by virtue of resorption of their alveolar surroundings.

Fig. 12 shows the common apparatus which I have used for years in these cases. To wide No. 34-gauge bands, perfectly contoured and fitted to the crowns, are soldered lingual and buccal rootwise plates for the attachment of long-bearing anchorage tubes

Fig. 13.

to support No. 16 traction bars. At the occlusal border is seen the interproximal fulcrum bar, which is similar to that devised by Dr. Farrar in his appliance for closing wide spaces between central incisors.

This appliance when in position forms an admirable anchorage, and is usually provided with extra buccal tubes (not shown in the drawing) for the attachment of arch bows to retrude the teeth in front. It should be remembered, however, that the reaction of

the retruding force exerted by the bow will be directed toward a mesial movement of the second molars, perhaps with too much of a closure in this way of much-needed space required for the retrusion of the teeth in front.

In these cases the principal retruding force should come from a combination of intermaxillary and occipital forces, the arch bow being employed only as a means to that end and for taking up the slack of movement.

As this combination of forces has been fully published by me in other places, I need not at this time enter into the details of its

Fig. 14.

application. I hope also that it will be understood in these distomesial movements of buccal teeth that due regard is given to the importance of an interdigitating occlusion of the cusps.

The intermaxillary and occipital combination is particularly applicable in all unimaxillary protrusions of the upper or the lower teeth, especially in those cases where the teeth of the opposing jaw are in normal dentofacial relations, and particularly in lower protrusions. It will be understood, I think, that though the occipital force in these cases is applied to the upper teeth through the medium of the upper arch bow, this force may be communi-

cated directly to the molars, and in turn, through the medium of the intermaxillary elastics, directly to any of the lower teeth.

In unimaxillary protrusions—or protrusions of either the upper or the lower teeth alone—when the teeth of the opposing jaw are retruded, it is needless to say that the reciprocating action of the intermaxillary force will usually be all that is needed to retrude the teeth of one jaw and to protrude those of the other.

With bimaxillary protrusions the principal force should be the occipital, though if the intermaxillary force be properly applied it will serve as an effective auxiliary.

Fig. 13 is that of an upper protrusion with lowers in normal dentofacial relations. The patient was about eleven years of age.

Fig. 15.

All of the first permanent molars, especially the uppers, were extensively decayed and imperfectly filled with amalgam. The impressions for the beginning casts shown were taken after the upper molars had been extracted.

A part of the impressions for the casts on the right were taken with the distal appliances in position, just before their final re-

moval. Fig. 14 shows buccal views of the teeth before and after treatment.

Fig. 15 is that of a bimaxillary protrusion. The patient was sixteen years of age when presented for treatment. As in the former case, all of the first permanent molars were badly decayed, as may be seen by examining the different views of the beginning

Fig. 16.

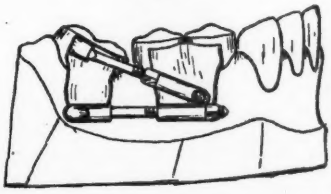
plaster casts in Fig. 16, which contain the four natural molars, and which, after extraction, were placed in the impressions before filling.

This figure shows the positions of the teeth in their present stage near the completion of the operation, the appliances having been removed that I might take the impressions for this exhibition. It will be seen that there is not the slightest inclination of

the *upper* molars after movement, nor of the lower left molar, though the latter is not now fully in place. The band around the lower right molar became loosened during the summer vacation, and as the patient was instructed to continue the force, it caused this tooth to assume such a decided mesial inclination that it was necessary to force it back to an upright position before starting the bodily movement again. The slight inclination which now exists in it will be fully corrected in the final process of movement. The drawing in Fig. 17 shows the apparatus that was employed to force the molar back to an upright position. It will also be used to close the space. The tubes in this appliance should be shorter than shown by the drawing, and sufficiently large to permit a slight hinge movement.

Bodily Movements of Front Teeth.—Of all the movements of the teeth in the practice of orthodontia, the bodily movement of

Fig. 17.

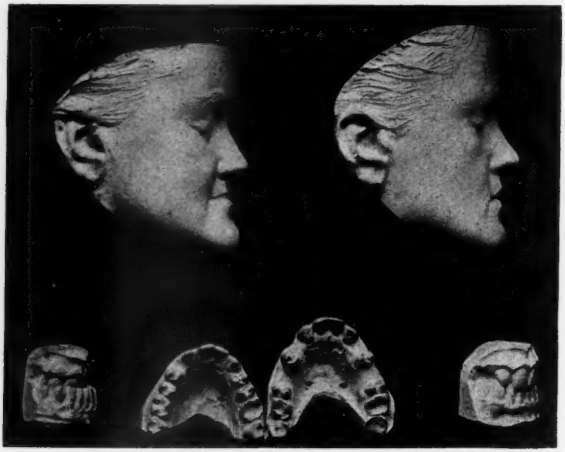


the front teeth in phalanx to correct dentofacial protrusions and retrusions is the most important. It is this more than anything else which should—and I hope will, in the years to come—raise this department of dental orthopedia to its highest plane of applied dental science and art. It is now fifteen years since this operation was prominently introduced and its truly wonderful results proved to be within the easy accomplishment of almost any skilful dentist. During these years hundreds of cases have been successfully treated by me, many of which have been presented before the most prominent dental societies of the world and widely published. Not only that, but almost every prominent dentist of Chicago has seen one or more of these cases, and many have given evidence in the discussions of my papers of an intimate knowledge of this work and its results, in the most laudatory manner. I feel confident that all who have had the opportunity will say that with

the exception of the few failures which fall to the lot of all departments of dentistry, the clinical observation of these results is far superior to anything which has or can be illustrated through the medium of the camera.

And yet this is what surprises me: After all that has been said and done, very few have attempted the scientific performance of this operation. I can partly account for this by the fact that few have had an opportunity to become intimately acquainted and skilled in the necessary details of construction and application of the special appliances which make this operation a success. Let

Fig. 18.



us hope that the time is not far distant when the world at large will have the opportunity and great privilege of receiving at the hands of skilled orthodontists these benefits which the comparatively few have been able to receive at my hands.

To more fully define the importance of moving the roots of teeth as illustrated by the bodily protruding and retruding movement of the front teeth, I have brought with me the lantern slides and casts of a few unpublished cases of dentofacial deformities.

Fig. 18 is an illustration of the casts of a miss of seventeen years, at the beginning of the operation as shown on the left, and at about eighteen months afterward as on the right.

The operation was performed largely for the purpose of correcting the facial imperfection, which gave to the features the appearance of advanced age. The upper teeth alone were moved in the operation, although the lower teeth were in a retruded position, as can be seen by the retruded lower lip in its relation to the chin. But the lower front teeth closed so far in front of the uppers, that to have moved them also forward would have produced the need of a still greater forward movement of the upper front

Fig. 19.

teeth, which seemed hardly warranted because of the already great movement that was necessary to produce the present result, and also in view of the fact, to which I think you will agree, that a prominent Gibson chin in this case does not particularly mar the facial beauty.

The patient had no lateral incisors, which doubtless was one of the primary causes for the lack of development of the upper jaw. There still remained, however, a small deciduous cuspid. The im-

pression for the upper was taken after this tooth had been removed.

The four upper front teeth, composed of the centrals and cuspids, were moved bodily forward in an *upright position,* to an extent that demanded two artificial teeth upon each side, a part of one of the spaces having been filled by the deciduous cuspid.

In all of these cases the alveolar process and often the entire intermaxillary bone—or incisive process—is moved forward or backward with the moving roots. To illustrate this, I wish to call your attention to a study of two cases, Fig. 19, in which the malpositions of the upper teeth were exactly opposite to each other—one being a full upper protrusion and the other a full upper retrusion. In both cases the lower teeth were in normal dento-facial relation.

It happened in both of these cases that the first stage of the operations consisted in moving the crowns alone of the upper front teeth. The effect of this movement upon the facial outlines, shown by the middle facial casts, is that which is often seen in these cases after a supposed correction by ordinary methods. The facial area which lies along the upper portion of the upper lip and base of the nose appears in the one case to be more protruded than at first, and in the other it is as fully retruded, with the same retraction of the end of the nose. In the final casts is seen the effect of bodily moving the roots of these teeth—in the one case backward and in the other forward.

One of the most remarkable movements of the roots of teeth which it has ever been my fortune to accomplish is shown in Fig. 20. Were it not that this case was examined in different stages of its progress by a number of Chicago's most prominent dentists, and the final results clinically shown at two of the Chicago clinics, I should have some hesitation in presenting the illustrations of it even before so enlightened a body of men as this, for fear there would be many unwilling to believe the evidence of their own eyes—proved by these pictures and fortified by a large number of plaster casts of this case which I brought with me for that purpose; and who might feel as did the farmer when, for the first time in his life, he was brought face to face with a camel in a country town circus. After looking at it intently, and I may say

skeptically, for a time, he turned away with this remark: "By gosh, thar ain't no such darned animal."

The character of this case when it fell into my hands was that of a decided retruded upper, which was enhanced by an open-bite malocclusion and a prognathic mandible. At this time the patient was between seventeen and eighteen years of age.

In viewing the physiognomies of all cases of upper retrusions, the first impression is that the lower jaw is protruded, even when it is in fairly normal relations; and so, where it is really prog-

Fig. 20.

nathic it often appears to be the main if not the only deforming feature, especially if the lower teeth are retruded in relation to the chin, as in this case, which causes the lower lip to take a more harmonious relation to the upper retruded lip.

As in many former cases of this class, the principal correction was accomplished by a bodily forward movement of the upper front teeth. The extent of this movement was so great that it opened spaces for the insertion of two artificial bicuspids on one side and one upon the other. The inequality of the two sides was

due to the fact that the teeth upon one side were far more retruded than upon the other, which, as can be seen by the dental casts, carried the incisors to the right of a normal position. This in the final casts is shown to be corrected, while the teeth are in a normal upright position. The artificial dentures were inserted by Dr. Hart J. Goslee, and when in position, with the teeth closed, the abnormality of the arches was hardly discernible.

I wish to call particular attention to the work that was accomplished upon the lower teeth. It will be seen at the beginning

Fig. 21.

that the lower front teeth were in a decided lingual inclination, and by close observation of the casts that there are five incisors, one of which is an artificial right lateral, supported by a slipper attachment to the cuspid. I wish you to note that the roots of the cuspid and natural lateral were quite divergent from each other, and that the intervening alveolar ridge was absorbed, with the pinched condition that is common upon the loss of one or more teeth. In the final casts the space occupied by the artificial tooth

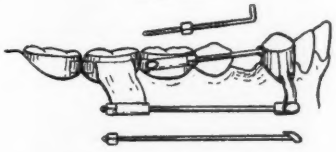
is perfectly closed by the adjoining teeth, which are now in normal parallel positions; also all of the lower incisors are not as lingually inclined as at first.

The open-bite malocclusion was corrected partly by grinding the molar cusps, but principally with the occipital force directed upon the lower front teeth, which raised them to a normal occlusion with the uppers.

I have in hand another case, which is not fully completed, but I am going to present it at this time because, in some particulars, it shows a more remarkable root-movement than that of the former case, in that it has required quite an extensive *distal bodily movement of the lower cuspids,* and also because the patient was twenty-four years of age when we started. (See Fig. 21.) We have now been working on the case for about two years.

It will be seen that the types of these two cases differ quite

Fig. 22.



decidedly from each other, though both belong in the class of "upper retrusions." In this case the lower teeth were protruded, but the mandible was not prognathic. In other words, the chin was not protruded in its dentofacial relations, as may be seen in the nearly corrected casts; whereas with the other case the lower teeth were nearly in normal dentofacial relations, with a decidedly prognathic mandible.

The upper retrusion in this case not being so pronounced, the need of retruding the lower teeth to a greater extent to harmonize the upper and lower relations was increased.

I at first thought this movement would not be difficult, but I soon found that with the most scientifically constructed appliances it was nearly impossible to move the roots of the lower cuspid distally, and that any force, however low it was applied upon the crowns, or even upon rootwise extensions, would at once tip the apical ends of the roots forward, unless these teeth were posi-

tively retained in an upright position with fulcrum bars at the apical ends.

This consequently required an unusual force upon the anchorages, which though constantly reinforced with the intermaxillary elastics, was so great, even with a three-band stationary anchorage, that the molar teeth were forced forward to a mesial inclination.

Fig. 22 shows the form of the apparatus which was at first em-

Fig. 23.

ployed in this case for the bodily distal movement of the lower cuspids. The lingual power bars attached to the rootwise extensions are not seen in the illustration.

It has been necessary to extract the two lower bicuspids on the right and one on the left. These spaces are now nearly closed at the contact points, as shown in Fig. 23. The main portion of the remainder of the work will consist in moving the roots of the

lower cuspids and molars until all of the teeth stand in a normal upright position. The buccal occlusal casts imperfectly show a part of the apparatus which is now worn for this purpose.

The upper denture is now practically finished. The incisors were moved bodily forward with the contouring apparatus. The cuspids and first bicuspids were forced to keep pace with the forward movement, with push bars from the anchorages. This left a space on each side for the insertion of artificial bicuspids, which will be placed as soon as the retaining appliance is removed.

I am pleased to say that when this case is finished there will be a perfect interdigitating occlusion of the buccal teeth, as in the former case; while the lower right molar standing next to the cuspid will be hardly discernible. The front teeth will be in normal dentofacial relations, with facial outlines quite perfect.

In conclusion, you will pardon me for saying that if it were possible for me to present to you both of these young ladies—who are Jewesses with soft olive complexions, beautiful eyes and hair, and charming manners—and then to show them as they were, you would never question the importance of moving the roots of teeth in dental orthopedia.—*Dental Cosmos.*

DIAGNOSIS AND TREATMENT OF CERTAIN ACUTE DESTRUCTIVE DISEASES OF THE DENTAL PULP. By W. H. G. Logan, M.D., D.D.S., Chicago, Ill. The purpose of this paper is to create, if possible, a greater interest in the more exact diagnosis in some of the various acute destructive diseases of the dental pulp, for if one always knew the true meaning of each clinical symptom or combination of manifestations resulting when the pulp is irritated, the number of alveolar abscesses could be greatly reduced, provided the operator does his full duty by removing this pulp when the patient presents himself with the organ in such a pathologic condition that at the most only a short duration of life to the tissue is possible. It seems to me that it is best to devitalize or anesthetize and remove that pulp when it is yet alive and in an aseptic inflammatory state, if such an opportunity presents itself, instead of waiting for it to die of its own volition with the possible and probable accompaniments of ulceration, abscess formation, or putrescence of the pulp and ultimate

involvement of the adjacent apical tissues. The paper will not, however, contend that all irritated pulps should be removed for fear they may die, but shall maintain that all pulps should be removed for fear of subsequent effects when an intelligent reading of the findings presented surely informs us that this pulp will soon die as the result of the tissue changes that have already occurred in this organ. Perhaps the reading of a brief poem that acted as a psychologic impulse in my deciding to write a paper upon this subject may best show the sentiment and ideas behind the essay. The poem is entitled, "The Fence or the Ambulance," and runs like this:

'Twas a dangerous cliff, as they freely confessed,
Tho' to walk near its crest was so pleasant,
But over its terrible edge there had slipped
A duke and full many a peasant.
So the people said something would have to be done,
But their projects did not at all tally;
Some said, put a fence around the edge of the cliff,
Some, an ambulance down in the valley.

But the cry for the ambulance carried the day,
For it spread through the neighboring city;
A fence may be useful or not, it is true,
But each heart was brimful of pity
For those who slipped over that dangerous cliff,
And the dwellers in highway and valley
Gave pound or gave pence not to put up a fence,
But an ambulance down in the valley.

For the cliff is all right if you're careful, they said,
And if folks ever slip or are dropping,
It isn't the slipping that hurts them so much
As the shock down below when they're stopping.
Then an old sage remarked, "It's a marvel to me
That people give far more attention
To repairing results than to stopping the cause
When they'd much better aim at prevention.

"Let us stop at its source all this mischief," cried he.
"Come, neighbors and friends, let us rally;
If the cliff we will fence we might almost dispense
With the ambulance down in the valley."

"Oh, he's a fanatic," the others rejoined.
"Dispense with the ambulance?—never!
He'd dispense with all charities, too, if he could,
No, we will protect them forever.
Aren't we picking folks up just as fast as they fall?
And shall this man dictate to us? Shall he?
Why should people of sense stop to put up a fence
While their ambulance works in the valley?"

But a sensible few, who are practical, too,
Will not bear with such nonsense much longer;
They believe that prevention is better than cure,
And their party will soon be the stronger.
Encourage them, then, with your purse, views and pen,
And while other philanthropists dally,
They will scorn all pretense and put up a stout fence
On the cliff that hangs over the valley.

As I read this poem the thought came that our profession for the last ten or fifteen years had given more attention to the therapeutic equipment and maintenance of its ambulance corps than to the consideration of the intelligent building of a fence in the form of proper diagnosis about these diseased pulps. This would decrease the number needing the kind of treatment that has been outlined and accepted by the profession as appropriate in cases of septic and putrescent conditions by such eminent therapeutic writers as Drs. Inglis, Rhein, Kirk, Buckley, Cook and Ma-Whinney.

Now, the endeavor to differentiate between the conditions found in the dental pulp without having the tissue placed under a microscope following that diagnosis for verification is a question that is rightfully open to discussion, and although that work has been accomplished I do not feel that my statements can be looked upon as final when I affirm that a pulp, if the seat of such a disease, will undergo such certain definite tissue changes that will cause it to die in a short period, even though given every therapeutic aid, because conclusive proof of such statements could only be established by first agreeing to the etiology, the symptomatology, diagnosis and tissue changes that have been claimed to have occurred. The next step must be the extraction of the tooth during a period of pain so as to obtain the tissue in its fully abnormal state. Then if specimens under the microscope verify our diagnosis of tissue changes we have yet fallen far short of our proof that this pulp would have died in a short time, even under the most favorable conditions that could be placed about it. And on the other hand, if on diagnosing a certain condition of the pulp as a given disease, that under a certain line of treatment it would continue to live, and if time proves our assertion, the designing critic can yet say that the pulp was not involved to the extent claimed, or it would have died.

But dropping such hypercritical thoughts and holding, as Dr. Louis Jack says: "In the treatment of an organ that cannot be brought under ocular inspection, the chief guides to determining its state are the apparent conditions viewed in connection with the symptomatology of the case under treatment." So in view of these facts I have considered my subject from a clinical standpoint along with the symptoms and tissue changes that I believe have an all-important bearing when we are called upon to decide whether a pulp should or should not be removed.

Assuming that we all agree that every necrotic and infected pulp should be removed if the tooth is to be conserved for any definite period, I shall not discuss these conditions or endeavor to outline their appropriate treatment, but confine myself to the discussion of (1) acute and passive hyperemia, (2) acute partial and total non-septic pulpitis, (3) when is pulp-capping indicated?

The first acute destructive disease of this organ that we shall discuss is acute active hyperemia, and since correct therapeutics must depend upon correct diagnosis, and holding that a comprehensive knowledge of the pathologic changes that occur in diseased tissue is essential for their correct diagnosis, I shall include in this paper the etiology, pathology, diagnosis, prognosis and treatment of each disease.

ACUTE ACTIVE HYPEREMIA, WTH ITS ETIOLOGY, PATHOLOGY, DIAGNOSIS, PROGNOSIS AND TREATMENT.

By active hyperemia of the dental pulp, I mean an irregular dilatation of the arteries that contain an excessive amount of blood. This active hyperemia of the pulp may be brought about by the application of any local irritant, or the presence of such systemic diseases as will momentarily allow the caliber of the pulp arteries to be increased. Active or arterial hyperemia of the pulp arising from the increase of the afflux of blood may be either idiopathic or collateral. The first of these plays the more important role, since it depends upon a relaxation of the muscular tunics of the artery, which may be brought about by either paralysis of the vasoconstrictors, which is neuroparalytic hyperemia, or through a stimulation of the vasodilators, resulting in a neurotic hyperemia, or through direct weakening and paralysis of the arterial vessels (as, for example, from the sudden bathing of a

tooth with extreme cold or hot applications, from the systemic action of such drugs as atropin, and from prolonged illness we sometimes find a decrease of the external pressure exerted upon the pulp vessels, with the resulting phenomena of active hyperemia occurring). Collateral active hyperemia is the result of a decreased flow of blood to some other part of the body sufficient in amount to cause an increase in a local area that has had its normal vitality lowered from previous irritation or from imperfect nourishment.

Having considered some of the obscure causes arising from systemic diseases that result in characteristic pain in active hyperemia of the pulp, I will now describe the more usual forms of local irritation and the conditions that allow these to occur. From the gradual destruction of the protecting wall of dentin and enamel by dental caries or accident, or the placing of metal fillings in close proximity to the pulp, we have in either case here established the opportunity of easy irritation of the pulp by thermal changes, which is the most frequent and direct cause of the first periods of pain that occur in active hyperemia, for we here find the ideal opportunity for the application of irritants that will cause loss of control of the vasomotor nerve supply to these arteries and capillaries. As further examples of such irritation as may cause this loss of arterial control, the momentary wedging of food against a thin wall of dentin, the leaving of unsterilized dentin between the filling and the pulp, and the presence of an alveolar abscess about one tooth frequently results in collateral hyperemia of the pulp of an adjacent one; the presence of lateral or apical non-septic pericementitis that results from over-malleting or the wedging of food between the teeth.

Diagnosis of Acute Active Hyperemia of the Pulp.—Although any one factor or combination of these factors may produce the disease, it is in the application of heat or cold or the sudden impact of food whereby we have produced the characteristic diagnostic signs of this disease. And those important characteristic diagnostic symptoms of acute active hyperemia will be found in the fact that the pain only occurs when irritation is applied and is of but a few moments' or minutes' duration at the most. The paroxysm of pain subsides without treatment and

such pain not occurring again until the application of another irritant. The period of such irritation is usually during the time of eating or drinking cold or hot food or fluids, or when exposed to cold drafts. The periods and character of pain are as stated, provided the irritants causing the pain be those named, but if the irritant is the wedging of food that acts the same as a filling that is inserted in such a manner as to cause constant pressure from the bending in of a thin intervening wall of dentin, our pain becomes paroxysmal in character and subsides for only a short period to occur again, for the reason that here the application of an irritant is constant, and this disturbance does not cease until the pressure is removed, and if the pressure is not removed the condition soon changes from hyperemia into that of pulpitis by a process that we shall describe later.

If these statements in reference to the symptoms be true, we should not expect active hyperemia to begin only in exceptional cases without the application of a definitely known irritant. And so the rule is that active hyperemia exists in a pulp when the pain begins with a known irritation, lasting for a few moments, or minutes at the most, and subsiding without treatment and not starting again until the application of another known irritant is made.

Prognosis of Acute Active Hyperemia of the Pulp.—With such a record and no previous history of there ever having been pulp pain in the tooth before, and if upon examination we find an intervening wall of dentin between the cavity and the pulp that will allow of appropriate cavity preparation and the leaving of even a thin wall of solid normal dentin overlying the pulp, I should always expect that in every case where I did my duty the pulp would return to normal after one or two treatments and remain so as long as the tooth received proper care.

Treatment of Acute Active Hyperemia.—After partially preparing the cavity by any plan that results in the removal of the greater portion, if not all, of the carious dentin, wash out this cavity with warm, mild antiseptic solution, then put the rubber-dam in position and place a pellet of cotton moistened with 95 per cent phenol into the dried cavity, leaving it for a brief period; then remove the phenol and desiccate the dentin with absolute

alcohol and warm air, after which place oil of cloves on cotton in the cavity and retain this remedy with cement if our cavity is one that is subject to occlusal stress. When the cavity is not so placed, guttapercha or Gilbert's stopping may be substituted. Dismiss the patient for one week with directions to report sooner if symptoms become more frequent or of longer duration.

If upon the return of our patient he reports no disturbance for the last two or three days, I would proceed to insert the permanent filling. If deep caries is present a cavity lining should first be placed beneath the filling.

If the case under treatment has grown worse instead of better, the periods of pain coming without irritation as well as with it, I would change my remedy from oil of cloves to the one outlined as appropriate for treatment of favorable cases of acute passive hyperemia and acute non-septic partial pulpitis.

Passive Hyperemia with Its Etiology and Pathology.—Passive, or venous, hyperemia of the pulp arises as a result of some interference that is sufficient to cause a thickening of the vein wall or the formation of a thrombus that will obstruct the return circulation of blood from these tissues through the veins. The frequent occurrence of retardation of the flow of venous blood from the pulp may be due in part to the histologic make-up of this tissue, and from Dr. F. B. Noyes we learn that the walls of the blood vessels of the pulp are made up as follows:

"A very striking peculiarity of the blood vessels of the pulp is the thinness of their walls, even the large arteries showing scarcely any condensation of fibrous tissue around them to form the usual adventitious layer, and usually containing but a single involuntary muscle fiber representing the media, while the walls of even the larger veins are made up of only the single layer of endothelial cells forming the intima and are in structure like capillaries. This peculiarity of the blood vessel wall is of great importance, as it renders this tissue especially liable to such pathologic conditions as hyperemia and inflammation."

Since the pulp veins do not have a normal sheath, the escape of blood elements through the vessel walls easily follows when the damming back of the blood begins in the vein by the obstructing thrombus. The thrombus remaining, the first result will be seen between it and the capillaries, the flow becoming slowed or

stopped temporarily, and when total stasis results necrosis of the pulp follows. But as a rule venous hyperemia of this organ only occurs after we have had a history of active hyperemia preceding it. Some of the exceptions to this statement will be considered under diagnosis.

In active and passive hyperemia, both the tissue pressure and tissue tension are increased. Therefore, although we may have an embolus deposited or a thrombus present that interferes with the outflow of blood, we must take recognition of nature's aid that accompanies active and passive hyperemia in the increase of tissue pressure that causes a progressive filling of the vein from the constant influx of blood from the arteries through the capillaries into the obstructed vein or veins. If the obstructing thrombus is not quickly overcome by the increased tension and pressure, or cared for by collateral circulation, we find transudation of the fluid elements of the blood and diapedesis of the red blood corpuscles into the very limited tissue spaces of the pulp outside the stream occurring. Where the pathologic involvement has been extensive enough to cause prolonged circulatory disturbances, these are creative of sufficient transudation of plasma and diapedesis of red blood cells to cause pain to arise of considerable duration and the paroxysms becoming more constant to the point of the patient not being free from disturbance between these periods. When such pain results the pulp is so extensively involved with the disease of passive hyperemia that I do not believe its return to normal for a sufficient length of time is possible to make it worth the effort to save the pulp, unless some exceptionally favorable circumstances exist about this tooth.

The diagnosis of the condition of passive hyperemia that has only progressed to an extent that makes prognosis and treatment usually favorable will be considered with the diagnosis and treatment of acute partial non-septic pulpitis.

ACUTE PARTIAL NON-SEPTIC PULPITIS, WITH ITS ETIOLOGY, PATHOLOGY AND PROGNOSIS.

An acute partial non-septic pulpitis is a true inflammatory involvement of a small area of the pulp. The portion of the pulp that at first undergoes inflammatory changes is as a rule the area that receives the burden of the shock when irritated. For

example, if one horn of the pulp is nearer approached by dental caries, that portion is first to take on the characteristic inflammatory tissue changes.

Etiology.—History of a previous acute and slight passive hyperemia, with or without large fillings present, or a slight exposure of the pulp, these giving opportunities for constant application of thermal changes, etc. The pathology of acute partial non-septic pulpitis follows the formation of a blood clot in the vein or veins of the pulp, found in passive hyperemia. If inflammation is to follow, certain changes beyond those characteristic of passive hyperemia must take place. The presence of the thrombus retarding or obstructing the outgoing blood causes an increased pressure on the distal side of the obstruction, with a loss of normal control of the influences that regulate the caliber of the vessels, the veins gradually dilate, increasing the size of their tissue spaces and allowing of the characteristic easy influx of fluid blood elements into the perivascular tissue, an exudate that always coagulates if inflammation occurs, *and this coagulation of the escaping fluid elements of the blood found in the perivascular tissue is the line of demarcation between passive hyperemia and any inflammatory process of the pulp.* Emigration of the white cells and diapedesis of the red cells take place with the exudation of the fluid blood elements. This escaping exudate is always small in amount in inflammations of the pulp because of its bone-like encasement, unless at some point in the pulp chamber there be a considerable exposure of the organ.

Diagnostic Symptoms of Passive Hyperemia and of Acute Partial Non-septic Pulpitis That Will Warrant Treatment with the Idea in View That This Pulp Will Live.—Pain, intermittent, the paroxysms lasting from five to thirty minutes. Pain will come without irritation as well as with it. Where the period occurs without irritation more than once or twice in twenty-four hours. I would not, with rare exceptions, endeavor to save the pulp, providing that the time of this return of such pain without irritation is at night. Slightly sensitive to both heat and cold. Pulp perfectly comfortable between periods of pain. Extreme irritation causing pronounced results, with the paroxysm subsiding in five to thirty minutes without treatment. The patient may or may not be able to locate the offending tooth.

My conclusions that these pulps may live beyond those of clinical experience and pathologic investigation are based upon the findings recorded by Dr. G. V. Black in an article printed twenty-two years ago in the American System of Dentistry, edited by Litch, and if one but stop to consider the meager amount of crystallized knowledge on this subject at that early day he must admit that this essay on the pathology of the dental pulp by Dr. Black is a master article by a master mind; and while he was discussing the recuperative power of an inflamed pulp he said: "It seems to me that these facts show that the dental pulp has considerable power of recuperation from an inflamed state, for it is certain that the moderate extravasation of blood is disposed of successfully, and that a considerable bulk, considering the size of the organ of inflammatory lymph, is tolerated without destroying it, and would undoubtedly be disposed of by the tissue if the case was placed under favorable conditions."

Before outlining the treatment indicated where we expect to save these questionable pulps, I wish to affirm that such efforts are apt to prove futile unless the patient is one that enjoys good health and of his own accord gives his teeth exceptional care and is regular in having his mouth examined by the dentist.

Treatment of a Favorable Case of Passive Hyperemia or Acute Partial Non-septic Pulpitis, as Was Outlined by the Diagnostic Symptoms of a Favorable Case for Treatment.—The remedy that I use most frequently in this class of cases was presented to the profession by Dr. J. P. Buckley, and termed *modified phenol*, and its component parts are:

℞ Menthol, ʒj
Thymol, ʒij
Phenolis, q. s. ad., fl ʒiij
M.
Sig. Use as directed.
Note: Heat the phenol and slowly add the menthol and thymol.

The remedy that I formerly used exclusively, and sometimes now employ instead of the modified phenol, is equal parts of oil of cloves and phenol.

In the application of either of these remedies the same tech-

nique is followed as outlined in the care of acute active hyperemia, with the exception that this pulp will not be in a sufficiently normal condition to warrant the insertion of a permanent filling in such a short time. Although I dismiss the patient for one week, my rule is that if the condition does not greatly and gradually improve he must return and have the application changed, not because of lack of faith in the remedy, but for fear I have not properly retained it, or perhaps I have caused pressure on the thin dentinal wall overlying the pulp by faulty technique while retaining the remedy, or by the leaving of the retaining substance so high that pericementitis is resulting; and another accident that may occur in the treatment of this pulp from our eagerness not to cause pressure is that we sometimes fail to perfectly contact our cement or guttapercha at the margins of the cavity.

TOTAL ACUTE NON-SEPTIC PULPITIS WITH ITS ETIOLOGY, PATHOLOGY, DIAGNOSIS AND TREATMENT.

Etiology.—History of a previous extensive hyperemia that terminated in the passive form or of a partial non-septic pulpitis.

The pathology of total acute non-septic pulpitis is the same in kind as found in partial acute non-septic pulpitis, only differing in the amount of pulp tissue undergoing the inflammatory change.

Diagnosis.—Large fillings present, deep or exposed cavities found with a previous history spoken of as venous hyperemia or partial non-septic pulpitis that may or may not have been of recent date.

If the case under consideration that is now terminating in total inflammation of the pulp has been one of recent hyperemia or partial non-septic pulpitis, we find that the frequency and duration of paroxysms of pain gradually augment as the increased blood pressure and tissue involvement occur, the paroxysms of pain lasting from one to four hours and starting with or without irritation, and the frequency of the pain increasing until it becomes almost if not quite constant. The patient complains of pain on that side of the face, but cannot always locate the tooth until the inflammatory process spreads beyond the pulp and causes non-septic apical pericementitis. This non-septic apical pericementitis begins in the average case on the third day after the total pulpitis starts, which is dating from the time the periods of pain begin to be

longer than thirty minutes in duration and occurring once or twice during the twenty-four hours without irritation. The occurrence of pain is more constant at night than during the day and lasts longer as a rule than periods that come during the day in spite of the fact that the pulp is not subjected to the same amount of irritation during these hours. We find a possible explanation of this greater pain that occurs in our patients at night in that we have a slight difference in blood pressure existing in the inflamed pulp that seems sufficient in amount to cause the variation in degree of pain found. Frequently our patient presents himself with the statement: The pain became very severe soon after retiring, but when he placed himself in an upright position it gradually decreased, but soon after reclining again the same character of pain started. With such clinical facts before us, and knowing that all inflamed areas are less painful when we place the tissue of the organ above the level of the heart, we find the plausible explanation of an increased pain in extensive pulpitis at night.

If an exposure of this organ is made it will be found filling the entire pulp chamber to its utmost capacity, for the reason that the obstructed, dilated vessels and the exudate found in the perivascular tissue of the organ cause decided distension. This will not be the case if we open into a pulp chamber that contains a pulp that has undergone abscess formation or ulceration, for here we find quite the opposite in no tissue being in contact with the dome of the pulp chamber.

Prognosis of Total Acute Non-septic Pulpitis.—When the pulp is the seat of such total inflammation as indicated, which is proved by the history of the pulp symptoms that occur and the findings that induced the perivascular tissue to become involved from a recent or previous disturbance of the pulp, I believe the proper course to pursue is to begin at once with the treatment that is to end with the removal of the pulp. I admit, however, that in many instances this pulp can be so treated that no painful response will result from the extremes of irritation, but regardless of this fact very close observation has led me to believe that such a pulp practically universally dies, either with or without pain, in the near future. The only exceptions to the uniform adoption of this rule of practice that the writer recognizes are when he finds

this pathologic condition of the pulp in a tooth whose roots have not fully developed and in the treatment of deciduous teeth that are soon to be lost.

When should we endeavor to save an exposed pulp? I would not endeavor to save the vitality of a pulp permanently when the exposure of the organ has been brought about by caries, for the rule is that all exposed pulps have undergone sufficient inflammatory changes to cause their ultimate death, even when carefully capped. Nor would I expect the pulp to remain alive for long where I caused an exposure by lifting out the softened dentin with an excavator, for the reason that before such an accident could occur the carious process has been of such long standing that it has allowed so frequent an application of irritants sufficient to greatly reduce the vitality of this tissue. Therefore, I would always remove such pulps if the roots of these teeth had perfectly formed.

Exposures made through healthy dentin with a bur that did not infect the pulp tissue, if properly treated, will give a sufficiently high percentage of successes to warrant our attempt to save this organ if we desire to do so.

The Technique of Capping Such an Exposed Pulp.—Assuming that the rubber dam was placed before the accident of the pulp exposure occurred (for if one is working about a pulp that is nearly exposed it is almost malpractice not to have the rubber dam on so that the field of operation will be dry and the operator's view not obstructed by the cheek or moving tongue), we may proceed to cap the pulp. Following our exposure, hemorrhage results. In the treatment of this hemorrhage I can see no harm in letting the flow of blood continue for a few moments, thus giving nature a chance to close the wound of its own accord, for I believe that a clot so formed may be more easily cared for than one that has been created by the aid of some irritating styptic. After hemorrhage ceases, remove all blood stains from the cavity with any warm, mild, astringent, sterile solution. The dentin about the exposure may be bathed with phenol (but this remedy is not applied to the pulp), the excess to be evaporated by warm air.

Mix precipitated calcium phosphate with oil of cloves to form a thick paste that is to be placed on the dentin at one side of the exposure and gently teased over the exposed pulp in such a man-

ner as to exclude the air, allowing it to settle to place gently, and flow on top of this paste that covers the entire dentin a sufficient mix of cement, and dismiss the patient after giving him an appointment to return in either three or six months, and before if any symptoms of pain in the tooth occur.

I wish to conclude this paper with a statement that has a bearing on the general treatment of diseased pulps.

In just the proportion that a pulp needs treatment, the essayist holds that the remedy should be retained with cement, providing the cavity is exposed to occlusal stress, and in just the proportion that this pulp needs treatment do I consider gutta-percha one of the worst things to retain the remedy, for the reason that the force of mastication may and frequently does carry bacteria and their by-products that are found in the dentinal tubules, together with a part of our remedies, directly through even a considerable portion of normal dentin into the pulp tissues. And before we can expect any remedy to have its full therapeutic effect, previous to its application we must remove practically all of the softened and diseased dentin that intervenes between the cavity and the diseased pulp.

DISCUSSION.—*Dr. C. N. Johnson,* Chicago. The paper to which we have just listened is exceedingly well timed and important. An organ with whose pathologic conditions we are so frequently called upon to deal should have received more consideration from the profession than it has, and it is gratifying to have presented to us at this time so comprehensive and detailed a statement of the various abnormal conditions following caries of the teeth to which the pulp may be subjected. I will not attempt a discussion of the pure pathology involved in the subject, but will merely touch here and there on some of the practical features of the question which we encounter every day in our work.

As the essayist has said, in diagnosing pulp trouble, we cannot avail ourselves of the benefit of microscopic study in each case as can be done with many affections of the human system, so our chief reliance must be upon the symptoms present. A close study of the symptoms of various pulp affections is therefore a very important part of the practitioner's equipment to meet and intelligently treat these cases, and be it said in this connection, that it

takes years of careful observation to enable a man to judge accurately as to what should be done in each case.

It has seemed to me that the tendency in recent times is to hold the pulp in too light a regard and to destroy pulps which could be saved. I am in full accord with the essayist when he intimates that an infected pulp should be taken out rather than that it should be allowed to remain with the almost certain result of ultimate death and pericemental involvement, but I am not in sympathy with a common tendency in the profession which seems to follow the Irishman's suggestion, "Whiniver you see a head, hit it."

There is another saying which I have seen quoted some place to the effect that "dead pulps tell no tales." This is not only cowardly but misleading, as many a tortuous canal has frequently demonstrated. I was pleased to note that the essayist called attention to the necessity for saving alive, if possible, all pulps in teeth, the roots of which had not been completely formed. To lose a pulp in such a tooth is to place the future of the tooth in jeopardy.

Another consideration in this connection is worthy of more attention than it receives. While a tooth after losing its pulp may be made, by proper treatment and filling, a useful organ for an indefinite period, yet the loss of the pulp seems to impair, in a certain sense, the integrity of the pericemental membrane. Dr. Black has conclusively shown that teeth with living pulps sustain a much greater stress on closure of the jaws than will pulpless teeth, and while this does not seem to affect materially the process of mastication, yet it is a fact which should not be ignored in the management of these cases.

Pulps will frequently recover even after severe irritation, provided the constitutional conditions are favorable and the proper treatment is instituted, and I would rather have in my own mouth a tooth with a living normal pulp than to have a pulpless tooth, no matter how skilfully the canals are filled.

It is often a nice point to decide between an attempt to save the pulp or to destroy it, but if the dentist will follow the teachings of the paper just read he will not go far astray. One of the indications to be observed relates to the color of the blood which issues from an exposed pulp. If the blood is dark in color, show-

ing congestion, it is an unfavorable indication, but if it is bright red or arterial in character the chances are in favor of saving the pulp. Another symptom to note carefully is the response to treatment when pain is present. If the pain subsides immediately and the tooth remains perfectly comfortable after treatment the indications are favorable, but if there is a tendency for the pain to recur at intervals it is a doubtful case.

I would not countenance the practice once in vogue of attempting to save all pulps by capping, but I do feel that in recent years there is a tendency to destroy more pulps than is necessary.

Dr. F. W. Gethro, Chicago. I agree with the essayist in the main in what he has said. Before discussing some of the points that have been brought out, I desire to express my thanks to him for his excellent paper and for bringing before us a subject that is of such vast importance to all. I agree with the author when he says that pulps should be removed if, from our best deductions, it is evident that sooner or later those pulps are going to be lost. I believe it is unquestionably good practice to remove them. He has dealt with this subject from a clinical standpoint, and I will not deal with it from any other viewpoint. I agree with him, too, when he says that when there is a thin wall of normal dentin covering the pulp it presents a very good opportunity for recovery to normal conditions. There is no question about that.

There are a few points I would like to bring out, and one is the treatment of acute active hyperemia. Dr. Logan says that "after partially preparing the cavity by any plan that results in the removal of the greater portion, if not all, of the carious dentin, wash out this cavity with warm, mild antiseptic solution, then put the rubber dam in position and place a pellet of cotton moistened with 95 per cent phenol into the dried cavity, leaving it for a brief period; then remove the phenol and desiccate the dentin with absolute alcohol and warm air, after which place oil of cloves on cotton in the cavity and retain this remedy with cement if our cavity is one that is subject to occlusal stress." I would say it would be better to make some reference to the way in which this carious dentin should be removed. I do not believe that "any plan" is a good plan. I would unqualifiedly condemn the dental engine at this point. It seems to me that in removing caries from a tooth the pulp is likely to be exposed, and I think

it is a dangerous thing to use the engine at this time. I am inclined to believe that when a pulp is exposed by a bur it will not recover its normal condition. I differ from Dr. Logan on that point. I am assuming now that we have normal conditions with which to deal. Of course, if we are dealing with carious dentin, we all agree that when a pulp is exposed or decay has reached it, there is very little or no chance for recovery. I believe the bur carries with it chips, etc., of dentin, and from the laceration of the tissue I would not think the pulp would return to a normal condition. So on that ground I would condemn the use of the dental engine. It would seem to me as if the best and practically the only instrument to use would be a large spoon excavator. This should be used in such a manner that it is impossible for it to slip by any accident into the pulp chamber. While I think that a pulp is not likely to return to a normal condition after it has been punctured by a bur, on the other hand if you simply cut the horn of the pulp or a part of the pulp with a large spoon excavator, then your chances are good that that pulp will return to a normal condition under proper treatment.

I differ from Dr. Logan a little in regard to treatment. I am somewhat old-fashioned. I use the oil of cloves. I find it a most excellent remedy in dealing with these cases. My method of removing the decay and in trying to have the pulp return to a normal condition would be this: I would expect to prepare partially this cavity before placing the rubber dam. I should expect to break down the enamel and make the general form of the cavity. I would do that with sharp chisels, and with those instruments this can be done with very little pain to the patient. As soon as you are coming to a point where you are at all likely to involve the pulp, the rubber dam should be placed. Dr. Logan at this point uses phenol and later alcohol. It seems to me as if the alcohol in its evaporation is likely to add to the hyperemia of the pulp and cause additional pain. I would only apply oil of cloves at this time to allay pain subsequent to the preparation of the cavity. I think alcohol can be used with much less pain when it is heated and then blown out.

Dr. Logan spoke of partially removing the decay. I would never go half way. If I am going to remove the decay with the hope of saving the pulp, I should certainly remove all of the decay

regardless of conditions. I think that this is the best way to save the pulp, if it is possible to do so. Therefore, I would remove all of the decay, and I would expect to put in a filling at this time that is going to be permanent at its base. I mean by that a cement filling, and let it remain. I would not expect to make more than this one treatment in the saving of the pulp. But now and then, we are informed by good authority that cement is not to be relied on. We know that at present there is no cement on the market that is impervious to moisture and will not shrink; one thing or the other—it will either shrink or take up moisture. But cement can be placed over this pulp, and then later covered with a guttapercha filling. I would differ from Dr. Logan in that regard, as I think a guttapercha filling over a cement base gives us the best possible chance of saving the pulp.

There is one part of the paper which could be elaborated with great profit. We, as dentists, fail very many times to consider the value of the pulps of children's teeth. Dr. Johnson has referred to that. It is a very important consideration, and certainly many times means either retention or loss of teeth. For instance, we know that the first permanent molar sometimes does not complete its development, so far as root formation is concerned, until the child is twelve years of age. It is important to remember that. In cases of children we may do some things and get better results than we can with adults. For instance, we may have an exposed pulp in the case of a child from caries, and yet by properly capping that pulp and giving it proper treatment it will return to a normal condition. This would not be true in most cases in adults. Possibly it is the extra amount of blood in the child's teeth at this time which accounts for the recovery or restoration.

I want to say a word or two with reference to the various nostrums that are sold by the dental depots for digesting pulps. I made an inquiry among the dental supply houses in reference to the various agents that are used to prevent abscesses and remedies that can be used so that we will not have to remove pulps. I found one place where they have four different remedies for those purposes, and I inquired as to the sale of them and was told that one of these agents sold like sugar in a grocery store. The dentist did not have to remove the pulp at all, but simply applied

this remedy. Now, gentlemen, that sort of thing we want to combat among practitioners. Dentists are looking for the easy thing, and that is one of the things that is entirely wrong. It is unscientific.

Dr. J. N. Crouse, Chicago. I am very glad that the essayist has given us such an elaborate paper on so important a subject, because it has seemed to me that in the last twenty years the destruction of the pulps of teeth has been altogether too common. With the advent of bridge work, of cutting down teeth for abutments following the killing of pulps, and then some failures and severe criticisms, the capping of pulps and the saving of diseased pulps by capping have become dead issues, and the profession has fought shy of that treatment. For forty years I have capped pulps where I thought by so doing I could bring about a normal condition of those pulps. I have hundreds of them I have capped in the last forty years that are doing well.

I would differ from the essayist in regard to treatment. I seldom remove all of the decayed portion if I am likely to expose a pulp in so doing. I prefer to treat the tooth in a way to get rid of any ill effects rather than remove so much of the dentin as will expose or nearly expose the pulp. That has been my treatment. Many times I have left quite a quantity of the decayed portion because I would rather prolong the life of a pulp five years and then have it die than to remove it at once.

There is one symptom on which I rely as to whether a pulp is alive or dead, but it has not been mentioned this evening. If I can get healthy sensation when I am excavating the dentin, I place a good deal of reliance on it. If I do not get that, then I begin to get suspicious; I go further, but become more cautious. But if I get healthy sensation between the enamel and dentin I have reason to believe that the pulp is healthy. If I do not get that sensation I will apply heat, and if I get an uncomfortable sensation from the heat I conclude there is gas there and it has expanded.

The diagnosis of these cases is important; but we cannot lay down any definite rule. I do not know of anything you can less accurately describe than a diseased pulp and to know when to cap it. I would cap them too often rather than destroy them too often, because patients may come back if the pulps give trouble.

I would rather take chances of having three pulps alive and one die than to destroy two out of four, and destroy two that ought not to be destroyed.

I differ from most practitioners in the material I use for capping. . I cap all pulps with zinc oxychlorid which will set hard. If kept too long it deteriorates with age, and you want to watch it. After it has been in the office for some little time you may find it necessary to use a new preparation. I have had a chemist prepare mine for me for years, and if I find it does not set well I take a fresh batch. After using phenol and oil of cloves, I fill pulp canals with zinc oxychlorid in preference to guttapercha or chloropercha, and my record is so satisfactory that I challenge anybody to produce more favorable results. I have but little trouble with teeth whose roots I fill. It is true, I have taken chances now and then, but if I were starting in practice again I should differ very little in that line of treatment, and I would make the plea to cap more pulps, to take better care of them and not destroy so many.

There are one or two things I want to speak of briefly that brought the treatment of pulps of teeth into some disrepute. You have heard of Dr. Allport. He conceived the idea of exposing the pulp and taking out a flap and bringing the two flaps together and healing them up, and then filling the tooth. I don't really know whether he performed that operation or not, but he advocated it in papers and in society meetings. We had a red-hot time over this method of treatment, so that he soon quit it. I took a hand in that myself. That was one of the ridiculous things that was brought about. But a rational treatment of exposed pulps is one that should be practiced by every practitioner of dentistry.

With reference to dentists going to dental depots and buying pulp digestants, I tell you, that dentists ought to conduct their own practices and buy what they ought to have and not what they do not need, and it is a mighty good thing to get lessons in buying what you can pay for and what you need. I am in the game more than I ever was, and I know more about it than I ever did. When men will take a mixture of ten or fifteen different makes of alloys that are lying around a dental depot, put them up, and sell that stuff at a dollar an ounce, and two-thirds of the dental practitioners will buy it, and by and by

want more of it, that kind of thing is deplorable. It is the same way with other things. It would be a good thing for dentists to take lessons on this subject and discuss these matters before the profession before they allow themselves to be imposed upon all the time.

Dr. J. P. Buckley, Chicago. It has been a long time since I have listened to the reading of a paper as scientific, and yet as thoroughly practical, as the one which Dr. Logan presented tonight. The last time I ever heard that noted surgeon and pathologist, who recently died, Dr. Nicholas Senn, speak was at a banquet at the Alumni Association of which I am a member. He emphasized then the necessity of the dental profession delving more deeply into oral pathology, and I am glad to know that we have some members of our profession who appreciate the teaching of Dr. Nicholas Senn, a great friend of the dentist.

Dr. Logan has discussed this subject from a pathologic viewpoint and has discussed it well. Now, when it comes to saving the pulps of teeth, Dr. Crouse is right when he said there is no set rule that can be laid down. We cannot follow any rule in our practice; each case, as it is presented, must be studied by itself and treated according to the operator's best judgment. There can be no doubt but what since we have had pressure anesthesia come into vogue, too many pulps have been removed. It seems so easy to take them out, to destroy their vitality, to remove them, and try to fill—although we do not all do so—the root canals.

There are, at least, three factors that should be considered when we attempt to save a pulp. I am talking now of a pulp which is not exposed. When a pulp is exposed, I do not care much whether it is done with a spoon excavator or bur—I do not care whether the blood is bright red or dark—if it is in a tooth in which the roots are fully developed, I would not go very far toward saving that pulp, but when I want to save a pulp there are three factors to be considered. One has been emphasized by the essayist, namely, the general condition of the pulp itself. I could not begin to describe the various conditions of the dental pulp as they have been described tonight. Another condition, which was intimated in the paper, that must be considered, is the condition of the patient's mouth. Dr. Hopkins of Boston conducted a series of experiments to try to ascertain the virulency

of different microorganisms in different mouths, and in the same mouth under different conditions, and he found that microorganisms proliferated more rapidly in neglected and uncared-for mouths, and that their virulency was greatly enhanced. If that is true, and we have these microorganisms that proliferate so rapidly and their virulency is so great in dentin which intervenes between the pulp and the cavity of the tooth, then we have got to consider them if we have a neglected or uncared-for mouth. A third factor that was also mentioned is the general condition of the patient—the general health of the patient. Here we have the general condition of the pulp, the general condition of the mouth of the individual, and we must take into consideration more than we do the general condition of the patient's health, his age, etc. If a patient is suffering with any general disease that interferes with the circulation, such as anemia or chlorosis, the chances are the pulp will die whether at the time it has an active or passive hyperemia, because that pulp will not receive the proper nourishment.

When we have decided to save a pulp there are three things we ought to do. One is, if the pulp is hyperemic, an anodyne should be sealed in the cavity in order that the pulp may revert back to normal. You have no business trying to save a pulp which is in a hyperemic condition until it has returned to a normal state. The second thing you ought to do is to sterilize the dentin. That point has been ignored tonight. It is unnecessary to remove all of the discolored dentin. There is a difference between carious dentin and discolored dentin, but that which you leave you need to sterilize. I want to tell you, ladies and gentlemen, that you cannot sterilize it with oil of cloves. There are some microorganisms that are happy in oil of cloves, when they are in test tubes in contact with your remedy, and the same thing holds true with regard to oil of cloves when applied to the cavity of a tooth. Under certain conditions oil of cloves is a disinfectant. If you have a sore on your hand and you apply oil of cloves to it, it is irritating; although it is an anodyne, it is sufficiently irritating to stimulate the animal cell, to wake it up, to give it new life and energy, and if you put life and vigor and energy in the animal cell, the animal cell will take care of bacteria—thus oil of cloves produces asepsis; but when the vegetable

cell is removed from the animal cell, as it is when it is in carious dentin, or in a test tube, then I tell you oil of cloves is not a disinfectant, and you cannot sterilize dentin with oil of cloves. The perfunctory method of sterilizing dentin, as usually done, is not the kind of sterilization we need when we have a pulp we desire to save. Many a pulp has died because of the lack of thorough sterilization of the dentin, which intervenes between the pulp and the cavity. Now, there are many remedies, but there is one remedy the essayist mentioned, which I do not care to emphasize because I suggested it, that will do both of these things, namely, it will allay the irritation when sealed in the cavity and it will sterilize the dentin. Where we have a tooth whose pulp is not exposed, it has an anodyne effect, and it will cause a hyperemic pulp to gradually revert back to the normal, and, at the same time, it will kill, not cripple, or not lessen the activity, but absolutely destroy the vitality of the germs in the dentin, and that is modified phenol.

℞	Menthol,	ʒj
	Thymol,	ʒij
	Phenolis (95 per cent),	fʒiij—M

Thymol has a peculiar, but beneficial, favorable action upon animal tissue, and the thymol in the preparation will sterilize the dentin to the degree necessary in these cases.

I do not know whether I understood Dr. Gethro rightly or not. I hope I did not, when he said to put cement in the bottom of a cavity without taking any precautions to keep the phosphoric acid of the cement from further irritating the pulp. If you are going to save these pulps at all, you want to save them for as long a time as possible, and to do this you must take advantage of every possible thing that is liable subsequently to shorten the life of that pulp. If you will take this modified phenol when you have the pulp reverted back to the normal, when you have the dentin thoroughly sterilized—the rubber dam, of course, is on—I don't care how you have gotten rid of the carious dentin, whether with a large round bur, such as I use, or by a spoon, or some other kind of excavator, but when you are ready to begin your filling, if you will take this modified phenol and precipitate calcium phosphate, a fine white powder, and make a creamy paste, and on

that paste sprinkle aristol or europhen—iodin compounds—and flow that over the entire bottom of the cavity, covering the entire surface, absorbing the excess of the liquid with cotton or bibulous paper, and when it is partially dry flow the cement, you will have prevented the irritation of that pulp by the phosphoric acid. Patients will not say to you, "you made that tooth ache." When I am trying to save a pulp in this condition, I do not want it to ache, and it will not ache if you take the necessary precautions. That is what Dr. Logan had in mind, I take it, when he spoke of the intervening layer over the dentin.

I want to emphasize the fact, again, that there is no rule for saving pulps. If a pulp is infected, as Dr. Johnson has said, it should be taken out. If there is any evidence of degeneration of the structural components of the pulp, it should be removed. There is no set rule for saving pulps. Each case, as it is presented, must be treated at the time according to the operator's best judgment.

Dr. Logan (closing discussion): In connection with my closing remarks, I wish to mention some authoritative statements in reference to the fact that bacteria and by-products go through normal tissue without pressure. Now, since we have started to put in so many gold inlays, what will probably happen to many of us will be that we will prepare the cavity, and when there is only a thin wall of dentin between the cavity and the pulp and we want more separation, we insert a mass of guttapercha and send the patient away, with the result that the patients come back to us with a bad condition of the pulp—a condition of very extensive hyperemia. That is almost certain to happen, and the only way to overcome it is to sterilize the dentin. We cannot sterilize the dentin with oil of cloves. I cannot do it, nor did I speak of doing it with oil of cloves. Sterilize the dentin if it has not been sterilized previously. Put in the sterilizing remedy over the dentin in the deep part of the cavity, with a thin wall of cement over it. You have made your wax impression, understand; you then place the guttapercha, and let the patient be dismissed, and the pressure will not come against the pulp and you will not carry infective material into the pulp. Many of us are going to make this mistake in the near future, if we have not done so already—we are going to prepare cavities and place gold inlays over pulps that are

either partially dead or over pulps which have undergone certain tissue changes to the extent that they are going to die, because we can prepare these cavities so easily by this method, and not fully realize that the pulps are not in a normal condition. As Dr. Crouse has said, you want to find out just the exact condition by the response you get when you are cutting and drilling into a tooth. The moment you look into a large cavity and begin to work in it, you may think that it will be sensitive, but it is not, and you must stop right there and test the pulp with both heat and cold, and if you get a delayed response from either heat or cold, go ahead and take out the pulp. But, at the same time, when you are talking about the question of delayed response to heat or cold, remember that secondary dentin may have formed and there is a greater distance between the cavity and the pulp than you think. But always test for delayed response. You need not worry about a pulp that hurts a great deal when you are preparing the cavity. You need not worry about a pulp that is sensitive to heat and cold, but look out for the one that is surrounded with caries and from which there is no response. It means a low vitality of the pulp, and that pulp will die later if you do not remove it now. So in that case be very careful that you do not put an inlay over the pulp that you thought was quiet, and have the patient come back in a week complaining of constant pain. The intervals between pain may be shortened, but the first thing you know it is sore under pressure, and you must go in and remove that pulp.

Dr. Gethro said he does not use alcohol on top of the modified phenol, or that he does not want to use alcohol at all. I only use alcohol where I have phenol. I only put phenol where I have dentin. I do not put it over the pulp. You must sterilize the dentin and, as Dr. Crouse has remarked, you do not need to remove the darkened dentin. If you remove the irritating properties that are contained in the dentin, what is the use of taking it out if it is an advantage to leave it in? Do not be frightened over dark dentin that is sterilized, but do be frightened about removing it if you are going to expose the pulp.

I wish to close the discussion by quoting a brief statement from Miller's work on "Microorganisms of the Human Mouth:"

"According to Arkovy, Rothmann and others, an infection of the dental pulp may occur while it is still protected by a perfectly

healthy layer of dentin. Uuder such circumstances Arkovy repeatedly observed the distinct phenomena of pulpitis and drew therefrom the conclusions that acute pulpitis must be referred to a much earlier stage of dental decay and dental infection is deeper than heretofore supposed.

"The microscopic examination revealed numerous micrococci in the connective tissue at the base of the odontoblastic layer, on the nerves, etc. Comparative examination of irritated pulps revealed no invasion of microorganisms. On the strength of these facts Arkovy assumed that a pulpitis due to systemic causes is not only possible, but actually occurs, and that the name 'Pulpitis acuta septica' is appropriately applied. I (Miller) regard it as highly probable that bacteria found in decaying teeth may pass through the tubules of a thin layer of sound dentin and encroach upon the pulp; that they may, however, pass through thick layers unless in very exceptional cases seems to me doubtful; that they may pass through the entire thickness of the solid dentin is quite out of the question."—*Dental Review.*

SUBINFECTION. By J. G. Adami, M.A., M.D., F.R.S., Montreal, Can. As the life to which we have dedicated ourselves is devoted to seeking the causes of disease and, determining those causes, is concerned with the rational means of treating and preventing those diseases, it may be that what I have to say will not be wholly without interest. We have been born into a generation of medical men that is above all interested in the subject of infection and the infectious diseases. The science of bacteriology has brought with it a medical renaissance. Never in the long history of medicine has there been such an upheaval, such a development as during the last thirty years, and this all through the demonstration of the fact that in case after case a particular disease is due to the entrance and growth within the tissues of specific microbes.

Now, Pasteur, the great founder of the science of bacteriology, laid down that the normal organism, or more correctly, the tissues in a state of health, are as devoid of bacteria as Paradise before the fall was devoid of a devil—or again to seek precision—let us rather say, of sin. It is upon this postulate that our science has

been based, and no one would gainsay that the postulate was absolutely essential for the development of the science. For employing the Euclidic method, let us suppose that healthy tissues are not sterile; how difficult it would have been for Pasteur and the early bacteriologists to convince the world that the organisms they isolated were the causes of infection! As it was, their task was difficult enough. It is to this assumption that we owe the greatest advance in surgical technique the world has ever known, and with it the saving of innumerable lives; upon it Lister based his antiseptic method, from which has developed logically the regime of surgical asepsis. The whole modern treatment of wounds, surgical and otherwise, has been determined and evolved from this primary conception that the healthy tissues are germ free, and that, therefore, if the entrance of germs into the wound from without be prevented there will be a natural healing, uncomplicated by infection and suppuration.

What I want to discuss with you today is whether this postulate is what may be termed a whole truth, or only a half truth, whether bacteria under normal conditions do not gain entrance into the normal tissues, or whether they do. Let me admit at the outset that if only half a truth, this Pasteurian postulate must be very near the truth; for otherwise we could not explain the marvelous results that here followed the advent of Listerism. Nevertheless, time and again we encounter cases which are difficult to solve save on the assumption that the postulate is incorrect, and does not represent the whole truth; cases, for example, in which a local injury of an internal organ; a joint, for example, in an otherwise healthy individual without superficial wound or abrasion is followed by the appearance of local infection of the part with the presence and growth in it of pathogenic microbes. How, it may be asked, did those microbes find themselves in the injured area, unless it be admitted that under normal conditions a certain number of bacteria gain entrance into the blood and so into the tissues? It may be said, it has been said, that in such cases there happens to be elsewhere—in the digestive tract, it may be, or on some mucous surface—an ulcer or abrasion through which pathogenic bacteria gain entrance; that, in short, individuals in whom occurs this succession of events are not in a normal state. But

this is purely an academic assumption that is not proved. There is the other alternative, and it is this, and what it signifies, that I want to bring before you this morning; namely, that the tissues of the normal healthy individual are *not actually* sterile and devoid of bacteria, but only *potentially* sterile; that constantly throughout life bacteria, pathogenic and non-pathogenic, gain entrance into the blood and lymph and so become conveyed to the various tissues, but as constantly, in health, these bacteria, whether pathogenic or non-pathogenic, undergo relatively rapid destruction through the various bactericidal agencies at the disposal of the organism; and, lastly, that without abrasion or destruction of the protective outer layers it may happen that bacteria thus gaining entrance may proliferate and cause infection, and this either (1) when the number gaining entrance and carriage to one focus is excessive, or (2) when the resisting powers of a tissue have undergone local diminution. I want to point out to you that the weight of evidence is so great in favor of this alternative that we are forced to regard it not as a postulate but as a matter that is positively proved. There is abundant experimental evidence bearing upon the subject.

This evidence may be classified under a series of headings.

1. *Histological:* The determination of the presence of bacteria in sections of healthy tissue.

If we examine sections from most tissues of normal animals, stained by appropriate stains, we gain no clear evidence of the presence of bacteria within them. There are, however, certain organs in which with a remarkable frequency microbes are to be detected. This was pointed out twenty years ago by the Italian pathologist, Bizzozero, and has been abundantly confirmed by Ribbert, Ruffer, Nicholls and others. If one takes the lymph nodules of the tonsils, the mesentery, the neighborhood of the bifurcation of the trachea, from the dog or rabbit, among a large number of small granules taking on the same stain as bacteria a certain proportion of perfectly formed bacteria is to be encountered. The impression given is that bacteria are conveyed to the lymph node in fair quantities, and then undergo destruction, and that at the moment of death and removal of the tissue certain of the recent arrivals are still intact. In our own laboratory Dr. A. G. Nicholls

has more especially worked at this subject. He has shown that if a healthy dog or rabbit be killed, if its abdomen be opened immediately with full aseptic precautions, and if without injuring or opening the intestines a thin piece of the mesentery be spread over a glass slide, penciled with a sterile camel's hair brush so as to remove the endothelium, and then after fixation in formalin, a piece be cut off and removed with the underlying slide, then appropriate staining and clearing constantly reveals this same appearance of minute stained granules, often in pairs, along with definite bacilli and cocci. These lie in certain tracts, apparently lymphatic channels, sometimes in small groups, as though within endothelial or other cells, sometimes free and isolated.

2. *Cultural:* Evidence of the presence of bacteria in normal organs by gaining cultures from the same. The evidence afforded by this method has been very contradictory, but upon careful study of the articles by those who have obtained negative results, it is seen that almost without exception their methods have been faulty. Let me give you an illustration of what I mean. For long years it was taught that typhoidal rose spots were of non-microbic origin. Observer after observer, upon attempting to make cultures from them, gained negative results. Then Richardson of Boston showed that if a rose spot be frozen by a minute spray of ethyl chlorid, cut into, and cultures made from it, colonies of typhoid bacilli could constantly be obtained. Previous observers had neglected to take into consideration the bactericidal action of the blood removed along with material from the rose spot. By freezing, the vessels became contracted and the blood driven out, and hence the bacilli are not destroyed and are demonstrable.

Upon removal of tissues there would appear to be an active liberation of bactericidal substances, and this more abundantly in healthy tissues than in those the subjects of active infection. And this has to be taken into account. The mere smearing upon solid media of the juice from healthy organs is bound to give ambiguous results. Results only can be expected where the bactericidal substances are neutralized or so diluted (by the employment of abundant fluid medium of culture) that they cease to be effective.

Taking the necessary precautions, Dr. W. W. Ford, in our laboratory showed that of 34 apparently healthy animals (dogs,

cats, rabbits and guinea pigs), furnishing ninety-three organs (in the main livers and kidneys) and one hundred and twenty-two cultures, 80.6 *per cent of the organs afforded cultures;* 65 per cent of the animals gave positive results in one or more of their organs. That this was not due to contamination during removal is indicated by the facts that (1) each species of animal showed its own peculiar bacteriology, and (2) each individual animal showed its distinct bacteriology; certain species of bacteria were peculiar to one particular species of animal, but along with these each individual animal might show some special form of microbe present both in liver and kidney, and not present in other animals of the series.

It is interesting to note the evidence of arrest of growth through the influence of bactericidal substances, shown by the fact that, contrary to usual experience with cultures made from the subjects of disease, Dr. Ford's growth did not show themselves as a rule until after three days, often indeed not until after a week or more. The bacteria were distinctly attenuated.

3. *The mode of entrance of microbes through healthy surfaces.* How do these bacteria, then, gain entrance through healthy surfaces? Here again we have evidence that cannot be negatived. We have to recognize the activity of the leucocytes. All my hearers, I take it, have, in the course of their routine bacteriologic work, taken a swab from the back of their throats, made a smear from the same, and staining it have seen the constant presence, in this fluid bathing the pharyngeal surface, of leucocytes containing a larger or smaller number of bacteria. If one makes a section of the fresh human tonsil, similar bacteria containing leucocytes can be made out in the outer layers, or otherwise, of the leucocytes, which find their way out on to mucous surfaces, and there act as scavengers, keeping those surfaces clean, while some are swallowed and others break up *in situ,* some, at least, make their way back between the surface cells and so into the tissues.

The best demonstration of this re-entrance of leucocytes from the alimentary tract has been afforded by Professor Macallum. The lake lizard, Necturus, found here in Lake Ontario, has the admirable capacity to undergo complete deprivation of solid food through the intestines for long periods. It may be starved for

many months and the experimenter may be sure that its gut is empty. Taking such starved lake lizards, Dr. Macallum fed them with iron albuminate. You all know Perls' test—the Prussian Blue test—for the presence of loosely combined iron in tissues. Making sections of the intestines and other organs of the lizards, at successive intervals and using this test, Dr. Macallum found that the iron is taken from the gut into the system through the agency of leucocytes. At the earliest period the granules of iron were present only in the lumen of the intestine. Then leucocytes, devoid of iron containing granules, were to be made out in increasing numbers between the columnar cells of the mucosa, next these leucocytes were seen in the lumen of the gut, and now they contained iron-holding granules; later such iron-laden leucocytes were present in abundance in the mucosa and villi of the intestine, and, lastly, similar iron-containing leucocytes were made out in sections of the liver, kidney and other distant organs, being present in the capillaries.

Now, what is true regarding one order of particles taken up by these phagocytic leucocytes must obtain for other orders of particles taken up by the same form of cells. It is the leucocytes primarily that transport bacteria, pathogenic and non-pathogenic, through the mucous membranes of the organism.

We are gradually gaining a knowledge of the conditions that favor this transport of bacteria.

(1) We find, in the first place, as shown by Lemaire, Wrczosek and others, that feed animals with a pure culture of a harmless organism, like the M. prodigiosus, in four hours or so cultures are obtainable from the liver, kidney and other distant organs. Given, therefore, the presence of huge numbers of a given species of bacteria in the digestive tract, some are sure to be carried into the circulation.

(2) Alimentary leucocytosis also favors the importation of bacteria. This was shown years ago by the great French veterinarian and bacteriologist, Nocard, who, investigating why if blood serum be gained aseptically from various animals to serve as culture media a certain proportion of these serums become contaminated, discovered that with scarce an exception the sterile sera came from fasting animals, while the contaminated had been drawn from

animals a few hours after the main forenoon or midday meal; all had been withdrawn with the same precaution; the afternoon specimens were not contaminated from without but from within; they were non-sterile.

(3) The presence of abundant fat in the food favors the importation. This was noted by Nocard and by Porchard and Desoubry, and has been confirmed by Ravenel and other recent workers upon the importation of the tubercle bacillus. As shown years ago by the great physiologist Heidenhain, part at least of the fats of the food gain entrance into the lymph and blood through the agency of leucocytes. Two possibilities suggest themselves; either the migrated leucocytes actively engaged in taking up fatty globules ingest along with them an increased number of bacteria, or, what seems to be more probable, the presence of fat within the intestines sets up chemiotactically an active emigration of leucocytes from the submucosa into the lumen of the gut; there are more leucocytes in the gut, and therefore these return into the tissues carrying their burdens of ingested bacteria.

(4) Then, again, active congestion of the mucosa, whether local or general, undoubtedly favors a great determination of leucocytes into the dilated capillaries and favors also their passage out. Along these lines is to be explained the observations of Posner and Lewin that the mere clamping of the anus or ligation of the rectum, without setting up any gross lesion of the mucosa, leads within eighteen or twenty-four hours to a general bacteriemia, the whole organism becoming infected with intestinal bacteria. The irritation set up by disturbed function must be recognized as producing the mucosal congestion just noted.

The more, in short, I work at this subject the more is it impressed upon me with what relative ease bacteria pass through the intestinal walls—as also with what relative ease individual bacteria, even when definitely pathogenic, become destroyed, by the leucocytes that carry them, by the endothelium of the lymph and blood vessels and by other agencies. One swallow does not make the spring; one microbe does not cause infection. Either several must be brought to one place, producing in their growth or in the destruction of certain of them, sufficient toxins to neutralize the protective powers of the immediately surrounding cells, or, as before

mentioned, the resistant powers of the tissues here or there must have undergone a preliminary lowering before such bacteria can manage to proliferate and become sufficiently numerous to set up infection.

Only recently my colleague, Dr. Archibald, in the course of a long series of experiments upon the mode of prevention of intestinal adhesions has afforded an interesting example of this free migration of bacteria. Setting up the mildest grades of aseptic irritation of the peritoneal cavity, he has found that, notwithstanding all precautions, the majority (66 per cent) of the recent fibrinous adhesions gave cultures or gave microscopic indication of the presence of bacteria.

What does all this indicate? This, I think, that we must not presume that every infection is necessarily preceded by some relatively gross surface lesion; what is termed *cryptogenic infection* may well be much more common than is usually held to be the case. So also—though this must seem to be a dangerous doctrine to enunciate—that not all infective surgical complications are due to the entrance of germs through the wound. The lesson to be learned here is assuredly not that of carelessness in the treatment of surgical wounds, but increased care in the preliminary "toilet" so-called, of the surgical patient. If, as these observations seem to indicate, such bacterial subinfection occurs most commonly through the walls of the alimentary canal, then the nearest approach to actual sterility of the tissues is to be gained by placing the bowels in the most healthful state, nay, by a complete flushing out of the bowels prior to operation. Empirically the surgeon has already learned the wisdom of this course.

When I brought forward these considerations some years ago in an address given in Chicago I went on to consider the bearing of these considerations upon the possible causation of certain chronic conditions, such as pernicious anemia and cirrhosis of the liver. Time prevents that I should take up these matters now beyond saying that I still adhere to the opinion that conditions of continued low congestion and inflammation of the gastric and intestinal mucosa, by favoring increased leucocytes of these regions, must bring about increased entry of microbes, pathogenic and non-pathogenic, into the system, and must result in increased liberation

into the blood and lymph of the endotoxins and other products of disintegration of these microbes which cannot be without effect upon the system; nay, must eventually result in such exhaustion of the cells mainly devoted to the destruction of the bacteria that eventually a terminal active infection may succeed these conditions of subinfection. From the laboratory of the Royal Victoria Hospital a few years ago Dr. Maude Abbott, in discussing the etiology of that remarkable condition hemachromatosis, a condition of diffuse pigmentation of the skin and other organs found associated with hepatic cirrhosis—enunciated the view that this was due to an increased destruction of the red blood corpuscles associated with intestinal inflammation and subinfection of the order here indicated. I have seen no reference to the recent confirmation of these views by Stokvis, Gibson of Edinburgh, Blackader of Montreal, and others, who have newly described a condition of microbic cyanosis, which Gibson and Blackader have independently found to be due to the presence in the blood of intestinal bacteria—B. coli. Grown in the presence of red blood corpuscles, the coli bacillus shows itself actively hemolytic; the cyanosis and extreme discoloration of the tissues in these cases is clearly due to the liberated hemoglobin, which, under the action of nitrites in the blood, becomes converted into methemoglobin. Microbic cyanosis, in short, is to be regarded as an acute form of hemochromatosis.

But before bringing my remarks to a conclusion I would call your attention to the more recent developments in connection with this subject of the natural passage of bacteria into the tissues, and this if only to demonstrate to you that we are dealing with a very live topic.

You must know that years ago Baumgarten gave out the hypothesis that tuberculosis in the adult is in general not a condition of recent acquirement, but is due to the active proliferation of bacilli which may, indeed, have gained entrance into the tissues during fetal life and for long years have lain latent in one or other tissue. It cannot be said that this view gained many adherents, although, coming from so well-known a bacteriologist, it has always obtained respectful mention. Now some few years ago the yet more celebrated bacteriologist von Behring, the discoverer

of the antitoxic treatment of diphtheria, came forward with the view that tuberculosis is most commonly acquired through the intestinal tract, and then in childhood, through drinking the milk of infected cows. He based this view upon the observation that young guinea pigs fed with bacilli show these in the mesenteric glands and other tissues within a few hours, whereas in older individuals it is the exception not the rule to find them. So he, like Baumgarten, laid down that the bacilli lie latent for years and then take on an active growth.

You know, of course, how lively has been the contest regarding the relative frequency of air borne and milk borne infection in tuberculosis, and regarding the relationship and properties of human and bovine tubercle bacilli. And, knowing this, you can understand how von Behring's observations have been put to the test.

Suffice it to say that prior to Behring, Ravenal, of Philadelphia, now of Madison, and others had demonstrated that in adult animals (dogs, etc.) tubercle bacilli could be detected in the lymph of the thoracic duct after appropriate feeding with the bacilli; that others have abundantly demonstrated that tubercle and other bacilli can gain entrance through the intact mucous membrane into the peritracheal and other lymph nodules connected with the respiratory tract; that it has to be recognized that all that is proved is, not that the bacilli cannot and do not gain entrance in the adult, only that the entrance in the very young is apt to be more abundant. What has more particularly stimulated these investigators is the relationship of primary intestinal entrance of the bacilli to secondary active and selective growth of the bacilli in the lungs. Years ago Koch pointed out that guinea pigs infected through the alimentary tract by feeding might show no abdominal tuberculosis, but primary pulmonary lesions. The observations I would bring to your attention bear upon the paths of this infection from the one area to the other. I do not think it is an exaggeration to say that there have been some fifty recent researches bearing upon this subject. At least a score of these have been stimulated by Calmette, an adherent of von Behring's hypothesis, who came out with a striking paper to the effect that anthracosis—the pigmentation of the interstitial substance of the lungs seen in

coal miners—is not, as had hitherto been taught, due to direct inspiration of coal dust into the air sacs of the lungs, with carriage of the particles of leucocytes from the air sacs into the lung tissue proper, but is due to swallowing of the dust and carriage of the same by leucocytes into the mesenteric lymphatic, and so eventually by leucocytes through the thoracic duct to the lungs as the organs of selective deposit and possible eventual discharge. So heterodox a view immediately stirred up workers in laboratories throughout France and Germany, and while a few came out in Calmette's favor, a baker's dozen and more have obtained contrary results. All that may be said to be proved so far is that if sufficient sepia or finely ground carbon be given to rabbits by the mouth for a sufficient length of time along with bland pappy food (so as not to cause any abrasion of the intestinal mucosa) then, eventually, the mesenteric glands become absolutely black with the particles that have been conveyed to them.

Observations with bacteria have, indeed, shown results which seem opposed to the theory of leucocytic carriage from intestine to lungs. Thus Uffenheimer has made the remarkable observation, which has been confirmed by some others, that if pure cultures of specific and easily distinguishable bacteria be administered to rabbits by rectal enema, in four hours' time cultures of the specific bacteria are obtainable from the mucous membrane and contents of the whole length of the alimentary canal, from the esophagus, the mouth, and even from the trachea and lungs, whereas the liver, kidney and deeply placed organs are found sterile. He calls attention to the need for extreme caution in laying down the course of the bacteria from one viscus to the other, there being evidently reverse currents which may be set up in the digestive tract, capable of carrying bacteria upward within the viscera from the rectum, and so eventually down into the lungs. One would suggest that these reverse currents account for the bad breath of the constipated! But here again we find other observers giving the lie direct. For us the interesting part is that even Uffenheimer admits that in a certain proportion of his animals he gained cultures of the specific bacteria from the mesenteric glands, although they were absent from the heart blood. He admits, therefore, the importation of non-pathogenic bacteria through the intestinal mucosa.

I would suggest that von Behring's observations upon the more active importation of bacteria in the very young animal is to be found not so much in the more active importation (though possibly that occurs) as in the lesser capacity of the leucocytes and endothelial cells of the young individual to destroy bacteria rapidly. What I would lay down in conclusion is the lesson that throughout life we are training ourselves to get the better of and to destroy bacteria. Our leucocytes are in continual training. It is not only when there is an abrasion and acute superficial infection that these cells gain their first call to take up and destroy bacteria, but constantly day by day and hour by hour they may encounter occasional stray microbes within the system, and aided, let us note by the opsonins normally developed in the tissues, and by yet other agencies, they become progressively more and more adapted to cope with microparasites of different orders. You, as future medical men, in your future immunity from various infectious diseases, despite constant exposure to infection, will yourselves demonstrate this development of a progressive latent immunity, will demonstrate the training of your leucocytes.—*Dominion Dental Journal.*

A COMPARISON AND AN OUTLOOK. By E. C. Kirk, D.D.S., Sc.D., Philadelphia. During the past seventeen years we have on frequent occasions and from various standpoints preached the doctrine of getting back to scientific foundations as the only secure basis upon which to build our professional structure. The age of empiricism is fast passing; indeed, if any period of time may be judged by its animating motive as well as by its accomplishment, the empirical age has already passed into history, and we are now in full sail upon the new waters of scientific spirit and achievement. All avenues of human activity are opening up to the inspiration of the scientific ideal, and what is done in each is the outgrowth of the effort to reduce that ideal to terms of practice. In years past the profession of dentistry was slow to accept the scientific standard; the earlier generations of dentists were concerned almost exclusively with details, with what they were pleased to term the "practical," and a broad distinction was generally made between the so-called practical and the "scientific." In the category of the practical

were included all things that would accomplish the object sought —that "would do the work," that "would work"—and whatever would result in the production of the largest bank account was the most practical thing of all. "Science" and "theory" were terms intended to designate the antithesis of "practical," and if not used in open derision were too often pronounced with a covert sneer and with the implication that the "scientific" or "theoretical" man was an impractical dreamer, useful perhaps as a sort of background to give the profession of dentistry something of respectability in comparison with other human activities, but not of much consequence otherwise.

So marked was this characteristic attitude of the professional mind less than one generation ago, that a well-known editorial writer of that period stated with some show of justification, in speaking of the small output of original literary matter in dentistry, that "the dental profession is largely written out." That period, however, marked the low ebb of the empirical *motif* in dentistry, though there were a few who with prophetic vision saw that a new era was dawning, in which the rehabilitation of dentistry would take place under the vitalizing influence of the scientific ideal.

The growth of the scientific spirit in dentistry has been endogenous as well as exogenous. The tremendous advances which have been made in our knowledge of all that pertains to the science and art of healing, through exact methods of study and of scientific investigation into all the processes of nutrition and their modification by disease-producing influences, have directed attention to the operation of these same factors in the oral cavity and its contained and related tissues and organs; and the application of the same spirit and method in the study of disease manifestations in that portion of the human organism has tended more and more to place our knowledge of disease causation, as well as our therapeutic treatment of these conditions, upon an exact and definite basis of rationalism. We are hearing less than formerly of the discussion as to whether pyorrhea is a local or a systemic disease; the tendency is to take the larger view that no disease is strictly local in the sense that it is without systemic relationships. We hear less than formerly of the hunt for the specific bacterium

which is the cause of pyorrhea, for the reason that the definition of the word "cause" is taking on larger proportions as we come to find out all that may properly be included in the meaning of that remarkably comprehensive term.

The study of the resistive forces of the organism is claiming our attention, and the problem of good health as well as the problem of disease is growing in importance and interest. The ideas of immunity and of susceptibility—causal factors within the organism as well as disease-creating elements external to the organism—are the newer thoughts which are giving rise to inquiries that can only be answered by the methods of scientific research, and within its own field dentistry must furnish the solution of these its own problems. From the wider realm of biological science has come the ferment of a scientific ideal that is rapidly working a change in dental professional thought and is creating a new professional standard. Within its own domain, however, the effect of experience—even of the experience derived from the empirical method—has, in a negative way, perhaps, been guiding the trend of development toward the same scientific ideal and method.

Every observant practitioner, as well as every student of the trend of affairs professional in dentistry, has been struck with the numerous instances when a new idea, with the stamp of the practical upon it, has been heralded as "the great thing," "the latest thing," "the best thing," has carried the profession by storm for the time being; then the enthusiasm has waned or died out, the pendulum has swung back—because experience has shown that the new idea was not by any means all that it was claimed to be. Hosts of new inventions, new methods, new materials, have been launched, have had their brief day, and have sunk into oblivion. These would never have been given a passing thought if the profession that welcomed them so enthusiastically and with such childlike confidence had been fortified by a better scientific knowledge of general principles and of the limitations of natural possibilities within the realm of dental endeavor and activity. Instruments that set at naught the laws of mechanics and defied the limitations of physics, compounds that did violence to the laws of chemistry, and medicaments conceived by minds unhampered by

any consideration of the principles of physiology or of therapeutics, have been exchanged for hard-earned money without stint and have been welcomed with unlimited credulity, because of the same lack of knowledge, the same want of faith in the saving grace of scientific fact, until by continued experience of this character there has come about a general awakening along the whole line. Men are growing tired of being duped, and are demanding the "reason why" before venturing upon untried or unknown fields.

Hence it is that, with respect to its appliances, its materials, and its methods, the profession of dentistry is demanding full and scientific information. Hence it is that, with respect to the disease problems with which it has to contend, the demand of the profession is for the full scientific explanation of its remote as well as of its immediate causation. Hence it is that dental practice is gradually shedding its swaddling-clothes of empiricism and is adopting the methods and manner of rationalism. Hence it is, also, that many of the old methods of dental education are growing obsolete, and that a new dental literature—one worthy of a scientific profession—is making its appearance, and that, far from being "written out," the dental profession is just beginning to write the most important chapter in its history.—*Dental Cosmos.*

THE CEMENTS AND GUTTAPERCHAS AS FILLING MATERIALS. By C. B. Rohland, A.M., D.D.S., Alton, Ill. In considering dental filling materials, their use and abuse, one cannot fail to be impressed with the ever-increasing importance of the plastics in present-day practice, and by "plastics" I wish to be understood to include only, at this time, the various cements and guttaperchas. Now so marked and rapid has been this growth in their use, that it may well be claimed that they have become by far the most necessary and useful of all filling materials, by reason of their wide range of application as well as their efficiency.

Anything within the whole field of operative dentistry that can be accomplished with cohesive gold, non-cohesive gold, and the amalgams, can also be accomplished with the various cements and guttaperchas, in many cases nearly as well, in many more cases just as well, and in many other cases even better. But neither

gold, in any of its forms, or even amalgam, can cover but a small portion of the field occupied by the plastics. In other words, eliminate all other filling materials, save the plastics, from the cabinet of the operative dentist, and he can still effectively perform the functions of a dentist. He can save teeth and minister effectively to the comfort of his patients. Eliminate the plastics and his power for good will be so handicapped, confined to such narrow limits, that so far as the principal requirements of the public are concerned, he might as well abandon his office, and betake himself to the laboratory, where the chief part of his work would then lie.

Gold has been set upon a throne and worshiped for so many years as the king of all filling materials that by iteration and reiteration the public as well as the profession has become imbued with an exaggerated idea of the universality of its fitness, and thereby entailed much trouble. To deny its kingly prerogatives, in any part of one's daily practice, was wont to be considered treason, and invited reflections on one's ability. In deference to this idea, which still prevails to a large though lessening extent, many and many a tooth has had gold hammered into it, that would much better have been treated in a different way.

Gold is King!—Long live the King!—True enough! Gold *is* King, but only in his own little principality, which is composed of a few narrow townships, as compared with the whole broad province of operative dentistry, and even there, in his own kingdom, his most trusted and efficient ally is the plastic.

Which leads me to lay down another proposition, based on nearly forty years' careful observation, that through the injudicious use of gold, fully as many teeth have been destroyed as have been saved. Now this statement is not predicated alone on the work of a few selected individual operators, but on the work of the entire profession, taken in the aggregate, including all from top to bottom. Neither do I include in this arraignment only the teeth actually injured and lost through the strenuous handling received in the insertion of massive gold fillings, though the list, if there could be one, would not by any means be a short one, but I include also the lost teeth of the numberless patients who were ruined as patients, because of their dread due to previous suffering. There

is not a dentist of any experience here within the sound of my voice, but can recall patient after patient, old and young, who at first submitted willingly enough, but at last lost courage, and came only when dire necessity compelled, or came too late, or not at all.

Now the injudicious use of gold has been unquestionably directly responsible for many of these cases. Taking these indirect losses then also into consideration, my estimate will be found to be not at all exaggerated.

Here, then, is where the plastic reigns supreme. While saving teeth, it also frequently saves patients for further service.

Now I have excluded the gold inlay from this arraignment, because, notwithstanding the wildly enthusiastic claims of these frenzied cast-gold lunatics, who are now running amuck through the length and breadth of the land, metaphorically "shooting up the town," and ruthlessly trampling under foot all the most sacred traditions of operative dentistry, and even threatening to turn the whole scheme of practice upside down. After all—in spite of their bluster—they are a very helpless lot! Their vaunted inlay is nothing after all but a cement filling with a covering of porcelain or gold to protect it. Set the inlay in the tooth with saliva, and it may be a thing of beauty, but in point of usefulness, it will be but a hollow mockery. Without cement, the most beautiful and artistic creation of the inlay worker is of no more use than a last year's bird's nest. Combined with cement, it gives promise of great things—great things. Whether quite as great as expected, remains to be seen.

The apparently unrestrained enthusiasm of its devotees, so suggestive of a most glorious jag, is also suggestive—of a next day's headache. Its seductive suggestions are more exhilarating to the earnest worker than champagne. Very few have escaped the spell of its fascination. And yet, when at times one comes across the beautiful, clean, clear, sharp margins of fillings made the old way with gold foil and the plugger, that have stood the test of time, unaffected, and compares them with the very best marginal adaptation of the best inlay efforts—well, to a man up a tree, who is still sober enough to stay there, it cannot fail to be just the least bit suggestive, until he almost fancies he can hear amid the din of the tom toms, the soft strains of that good old hymn "Oh,

What Will the Harvest Be?" This remark is made, not in the way of criticism, but solely in the interests of sanity.

Anyway, no matter what the answer, the inlay worker is compelled after all to take his hat off to the cements as the most important element, the only saving clause in his filling—the only feature that gives it any standing whatever as a tooth-saver.

Now, in view of the indisputable facts already mentioned that whatever can be filled and saved with gold or amalgam, can also be filled and saved with the plastics with but little more watchfulness, that in children's teeth, in frail teeth, in frail patients it is more effective, humane and desirable, that the problem of root filling has been simplified and solved by its use, that the inlay worker is absolutely helpless without it, that many of the problems confronting us in daily practice could not be handled without it, that in short, the dentist deprived of it would be like Samson shorn of his locks, is it not about time that gold be dethroned and a real king, the plastic, put in its place? I will not take up your time discussing the use and place of guttapercha in dentistry. It has been with us so long that everyone is familiar with its nature and its possibilities. It has found a place for itself in every office and has become indispensable. It would be difficult to find a substitute. As a help in the care of our little patients, as a standby in root filling, in crown setting, in cavity filling, either as a temporary expedient, or even for tentative permanent purposes to tide over the weak, the nervous, the sick, the faint heart, surely one could hardly keep house without it, with proper manipulation it may be made to serve indefinitely from months to years, according to the condition. If intended to last indefinitely the principal precaution to be observed is to be sure not to overheat it and—give it a lining of cement.

The various cements, notwithstanding the uncertainties of their behavior, and the acknowledged fact, in spite of the enthusiastic advertiser, that the manufacturers are still groping after the ideal, is now occupying, as I have said, such a large and important place in daily practice that it is difficult to imagine how the dentist could now practice without it. This apparently erratic behavior, which so often affects its durability and the confidence of the dentist, it is reasonable to assume will in time be largely if not en-

tirely overcome. Improvements are constantly being made. For years amalgam was denounced as a tricky filling material, and justly so. But, thanks to the investigations of our Doctor Black, and the consequent more intelligent efforts of the manufacturer, much of this uncertainty has been eliminated, and amalgam now, with better understanding—and a lining of cement—is much more reliable as a tooth-saver.

I question whether this erratic behavior of the cements is not after all more due to their manipulation—to the varied personal equation in the mix than to the inherent character of the material itself. Observe different operators and scarcely two will be alike in their treatment and manipulation of the material. The place where kept, the condition and character of the vessels containing the powder and the liquids, the mixing slab, the proportions of powder and liquid, the rapidity, the thoroughness, the consistency of the mix, the method of insertion, the treatment of the filling during crystallization and the processes used in finishing, as well as atmospheric conditions; all must have a powerful influence on the finished product. Which leads me to observe that whatever cements one may elect to use it is but fair to the manufacturer that his instructions be followed to the letter. By reason of his close study, his wide experimentation, as well as his own direct personal interest, he is most desirous to bring out the very best of which his product is capable, and naturally knows best how to do it.

The dentist, like the manufacturer, is vitally interested in the same result, and of necessity he must not fail to do his part. That the manufacturer of cements has made great strides toward the improvement of his products, is made clear by a comparison of the present cements with the earlier ones. Without even going outside of our own society, compare our own Ames products, the Fellowship New Process and the Hewitt cement with the old Welsh oxyphosphate, for instance, which had such a large run ten years ago.

One can find therein much encouragement for the belief that an approximation at all events toward the ideal filling may not be so very far off.

For example, among the later products, the silicate cements in

one respect at least seem almost to have reached perfection. Their appearance, when first put in, leaves very little to be desired in this respect, being a close rival to the best porcelain products. As to the other qualities necessary to make them ideal the testimony is conflicting. That they shrink and that they are porous, both undesirable if not fatal qualities, are among the most serious charges made.

On the other hand, Doctor W. V-B. Ames, than whom there is today no greater authority and to whose researches undoubtedly much of the improvement in the present manufacture of cements is due, is of the opinion that some of the silicate cements of today have already made a place for themselves, and that this place is in the filling of such small cavities as are not subject to direct occlusion or abrasion, as in small approximal or gingival cavities. He thinks further that unquestionably these materials will be greatly improved, but that even now "these calcium, silica and alumina oxyphosphates will withstand the products of fermentation and putrefaction under conditions in which zinc oxyphosphate would be rapidly destroyed. So in these small cavities between incisors, for instance, where saliva stagnates and food debris ferments and putrifies, I expect them to be very useful and a God-send to dentist and patient as compared with the making of gold fillings or porcelain inlays."

Now this testimony, coming from the source it does, is of sufficient importance to indicate that there is something in this new product that may be worth our very serious consideration. In my own hands the results have not yet been very satisfactory. This, however, may have been and probably was entirely due to faulty manipulation, as my experience has been limited to but a few kinds and a limited number of cases.

One of the old cements that I believe does not at the present time receive as much attention, either from the dentist or the manufacturer, as its virtues merit, is the zinc oxychlorid. It contains within itself invaluable qualities. As a root canal filling it has in some ways, in my judgment, no equal. It can be worked into the most minute and tortuous of canals. It is antiseptic, in canals it is durable—in cavities it is preservative, stimulating. It is, however, unfortunately, soluble in the oral fluids, but unlike the phos-

phates, decay will not burrow under it. Aside from the more or less irritation which sometimes follows its use in root canals, but which usually soon passes away permanently, I have more confidence in it there than in anything else. To avoid this irritation I sometimes fill the apex with guttapercha and the balance of the canal and the pulp chamber with the oxychlorid. I remember seeing an account somewhere of some experiments on the efficacy of the various cements and guttaperchas in excluding from cavities microorganisms. The results showed that the only one of all the filling materials experimented with, that absolutely excluded germs, was zinc oxychlorid. These conclusions have not, so far as I know, been contradicted. Since then whatever I may fill the root canals with I always fill the pulp chamber with this cement. I believe it to be good practice.

Could the virtues of the silicate, the oxyphosphate and the oxychlorid be combined, it would seem as though very little more could be desired.

I once heard the suggestion made that perhaps in the oxychlorid as a point of departure in experimentation, might possibly be found the germs of the future cement filling. Whether that be so or not, even now—*The Plastic is King! Long live the King!*—*Dental Review.*

THE DISREGARD OF STANDARD METHODS AND ITS EFFECT ON PROSTHETIC DENTISTRY. By N. J. Essig, D.D.S., Philadelphia, Pa. It might be well to preface the remarks which are to follow by disclaiming any intention to arraign or criticize the dental manufacturing companies, or to imply that there are not prosthetists who are following the teachings received during their college education, but the responsibility for the condition of prosthetic dentistry today rests somewhere, for there is undeniably a tendency to fall behind and disregard methods which have been proven requisite and necessary in attaining best results.

Naturally a manufacturing company will not manufacture nor produce articles of a variety for which they have no demand; the stock carried by mercantile houses largely depends on the demand; in other words, if the trade wants a particular article the manufacturer is not long in finding it out, and will soon have a supply

equal to the demand, whatever that may be. It is strangely true that at the present time, when everything is being imitated so closely that it is impossible to detect the imitation, prosthetic dentistry seems to have fallen behind the pace set in other arts, and is not even up to the standard of thirty years ago. This is a singular fact, for here is presented to us one of the best opportunities for artistic reproduction and display of skill.

Artificial Teeth Criticized.—That more attention has not been paid to this feature, the dentist alone must bear the responsibility. His capabilities are only limited by the fact that in many instances he cannot buy at the dental depots what he must regard as his raw material. To make clear these thoughts we may take, for example, the molds and shades of porcelain teeth obtainable.

These differ materially from the old ones, which were comparatively few in number, but natural and lifelike in appearance, while those of today are numerous, with either very pale or muddy shades of green and brown predominating.

The most noticeable change has been in the bicuspids and molars. These are so small and present such a meager grinding surface that they not only do not give the patient the area of surface required for normal mastication, but they present an unnatural surface to the tongue and form a place for the lodgment of food. These fail to restore the mouth to its normal condition, and the writer believes that this feature of prosthetic dentistry is as important as any other.

The patient is required to become accustomed to a mechanical contrivance, and it is the duty of the prosthetist to render the mouth as nearly normal as possible, so that in talking and eating the tongue may come in contact with surfaces and objects as nearly like those bestowed by all-wise Providence as may be.

We were all taught that the use of cross-pin teeth was to be avoided except where the case absolutely would not admit of the use of a straight-pin tooth, yet it is impossible to find an assortment of straight-pin teeth sufficiently large from which to make a selection, and those in charge of that branch of dental supplies will inform the purchaser that they are not carrying much of a stock of straight-pin teeth because they have no demand for them. The question arises, "Why is there no demand?" The answer nat-

urally suggests itself, "Because the dentists do not want them." This is deplorable, because it is different from the teaching received from men who thought out and systematized mechanical dentistry, and also because it is our duty to patients in our charge to give them the best and most permanent, no matter what trouble is entailed. This will surely prove bread cast upon the waters, if we feel that there must only be a commercial view of the operation.

Supplies Retired Because of Lack of Demand.—There are many articles which have formerly been in daily use in the office and laboratory of the average practitioner, which are not easily obtainable now; for instance, the white paraffin articulating wax used for obtaining articulation in plate and crown and bridge work. This wax was rigid and required quite a good deal of manipulation to make it soft enough for use. Once, however, the operator obtained a good "bite" in this wax he was able to remove it, and place it on the plaster model without any change thereto; this is one of the most important details pertaining to the making of a satisfactory denture. The fact that it entailed some trouble to warm and soften this wax was sufficient reason for the majority of dentists to look for a softer variety, one that could be worked more quickly and with less trouble; the inevitable shortcut; consequently the dental depots gave the dentist what he wanted, a wax which in no way is as reliable, nor does it take the place of the old white paraffin wax. There is another variety of wax which is very important in the construction of vulcanite work, known as base-plate wax. The base-plate wax we get at the present time is not suitable for vulcanite work; it is too thick to use two thicknesses, and too thin for one thickness, yet we were taught that to make the neatest vulcanite denture, two thicknesses of thin base-plate wax, when pressed separately upon the model, made the thinnest and most uniform vulcanite dentures. This wax can only be had now by having it made to order. Many dentists have never during their professional career used the thin wax above mentioned, and one of the rarest things in dentistry is the swaged trial plate, made of air-chamber metal.

Good Methods Abandoned.—It is surprising to learn upon inquiry the number of fundamental rules of dentistry which are en-

tirely ignored by the profession. The making of clasps, for instance, is a feature of the prosthetist's work which is sadly neglected, and in consequence is condemned and blamed for the trouble really caused by maladaptation. Few men go to the trouble to mark their model properly and make a pattern which corresponds to the marking; in fact, few men study the case and make a plan at all. The practice of making the clasp concave so that only the edges come in contact with the tooth, and the intelligent bending and adjusting of these attachments, seem to hold the attention and thought of the average prosthetist but little.

It is a matter of wonder that many of our practitioners use impression plaster for all purposes; that impressions are many times taken with the modeling compounds, and instead of using soldered attachments for teeth on full and partial pieces, the plate is struck up and the teeth attached by means of vulcanite rubber.

It is obvious that several thin pieces of gold when swaged and soldered together not only give the ideal adaptation, but also rigidity and strength, yet how many men make it their custom to do this in upper dentures, or even in lower ones? The fact that some of the necessary articles are unobtainable at the dental depots is the fault of the dentist, and while he alone must assume the responsibility of keeping up his standard, the dental depots must help and we would remind them that they have always professed an interest in doing this.

Laboratory Supplies.—In the matter of laboratory furnishing, there are a great many essential articles which are sold to us in a very inferior form. The wheels for finishing and polishing metal and vulcanite work which are presented for sale are much inferior to those we used to get, and many laboratory tools of special pattern are no longer to be had, the same claim being made; "that there is no demand for them."

The form of tinfoil known as pattern tin is rarely asked for by the profession, one of the leading manufacturing companies stating that they give away a great deal more than they sell. This is rather difficult to understand, because unless accurate patterns are made for most of the component parts of our metal work, the result must necessarily be inaccurate, and yet it is hard to find in the average laboratory, pattern tin of sufficient thickness to swage.

Many times we feel annoyed and vexed at the fact that we cannot get the materials we desire, and our resentment is naturally directed toward the manufacturer, but at this point we must not overlook the fact that when articles are unobtainable it is proof positive that the majority of the dentists have discarded them. Manufacturers naturally produce that which they can sell most readily, and like all mercantile houses of the present time, will take care of the man who buys his goods and supplies in the greatest quantity. An instance of this kind came to the notice of the writer a short time ago when asking for certain teeth; he was told "that the mold had been destroyed, and that there was no demand for them." During the conversation he was shown a small tooth of the hue obtained by years of tobacco chewing, and informed that there was a man who twice a year bought one hundred sets of fourteen teeth each of this same mold and shade, and that he did not use any other size or color.

The retrograde movement in porcelain teeth has not come upon us suddenly. For years the writer has had a large experience in prosthetic dentistry, and it has been a noticeable fact that each year it becomes harder to maintain the standard he has always set, and in anticipation of this, learned mold-making so that he could make his own molds in cases where he found it was impossible to obtain that which would answer the purpose in the stock carried by the different manufacturing establishments. A manufacturer of porcelain teeth recently made the remark, "It is a fact that the teeth are not as good with regard to size, form and shade as they used to be, but the dentists are getting what they ask for; the dental depots naturally make the molds that are most saleable."

It would seem that the same difficulty in obtaining and replacing some of the necessities in dentistry extends throughout all its branches, though to a more marked degree in prosthetic work. We are better equipped at present in many ways than at any other time in the history of dentistry; we have appliances and paraphernalia which enables us to do many unique things and in the easiest possible manner. We have the electric furnace, the casting machine and numerous contrivances for making seamless crowns; in fact, a host of appurtances, which not only facilitate work, but largely contribute to the amusement of the operator. These inven-

tions engross his attention and that of the dental societies seemingly to the exclusion of some of the more important details of dentistry, which are the foundation of our work. These innovations have their place and are very valuable adjuncts, and there are presented to us instances where they may be made use of to infinite advantage, but it is hardly likely that bridges, dentures and the like will be dispensed with; therefore, it is still necessary that this work should be done, and those who still take pride in this branch of dentistry undoubtedly will wish to do so after the most approved methods.

It has been said that when the dentists essay to write or speak about other than the newest devices, they turn back fifty years for their subject, while many features of their present professional work require their attention and thought to a greater degree. There seems to be a tendency to be satisfied with the present imperfect state of affairs and to hunt at all times the shortcut. This is especially true of recent years, and cannot but end disastrously, for dentistry is no exception to the old rule, "that to stand still is to go backward," and this we surely are doing.

The writer has made an effort to point out as he sees it certain difficulties and shortcomings without placing blame or responsibility on any person or persons. A certain amount of responsibility must be assumed by those directly and indirectly concerned in our profession, and if the dental manufacturing companies cease to produce that which is necessary to the maintenance of a standard to which some of us aspire, and leave the management and manufacture of their porcelain teeth to those who may in no way be considered artists, they should not take exception to the fact that it has been noticed. On the other hand, if our practitioners discard and cease to use appliances and necessaries required to do the best work, they should not place the responsibility on the manufacturers. The hardship really falls upon the conscientious man, who is not afraid to devote his time, thought and skill to producing that which not only fills the necessary requirements, but is also most artistically and thoroughly wrought.

This article is an earnest, heartfelt appeal for more conscientious work, for better adherence to those principles and details that can not fail to produce the best results, and while it is necessary to

keep abreast with the times, there are certain old-fashioned rules which must not be allowed to fall into disuse, for just as surely as this is allowed to occur, just so surely will creditable results and esthetic productions from the laboratory of the prosthetist become a thing of the past. Whether or not there exists a tendency to lay too little stress upon the details of our work by those whose function it is to train the student in the fundamental principles of prosthetic dentistry, or whether the students naturally fall into careless ways, must be decided by members of the profession who have sufficient interest in the future of dentistry to try to stop this retrograde movement and endeavor to replace dental prosthesis where it properly belongs, and keep it moving forward until its position is commensurate with its possibilities.—*Items of Interest.*

COHESIVE GOLD. By L. S. Tenney, D.D.S., Chicago. The question of filling materials is still with us, and I trust ever will be. When this question shall have been finally settled; when we may state with scientific precision and certainty just what material shall be used in each given case and under all conditions, then indeed dentistry will have lost half its charm, and we shall have approached nearer than we ever have the occupation of the mechanic.

Let the question be fairly stated. The question is not, as I understand it, what material is best adapted to certain special cases, or under certain special conditions, or in the hands of certain individual operators; but rather the question is this: What material, taking into consideration all cases, all conditions, and all operators, possesses the most points of excellence and has the widest field of usefulness? I had supposed that this was not a debatable question, and that the profession was practically a unit in the position that I maintain, namely: That the material which stands preëminently above all the others, that has nothing to equal or in any manner approach it as a preserver of teeth, is gold—not gold used in the unstable form of soft foil, not gold used in the uncertain and unreliable form of the inlay, but cohesive gold inserted and condensed with plugger and mallet.

Let me say at this point that I am neither an extremist nor a faddist. When I was requested to take part in this symposium it was suggested that I exploit cohesive gold as a filling material, and

to deprecate the use of all others. This was to be "an arena for the exhibition of champions." I cannot take this part. The filling materials we have at our command are all of service to me in my work. I do not see how I could dispense with any one of them and yet serve my patients as they want to be and ought to be served. Amalgam, at times almost discredited by our profession, serves me a most useful purpose. Guttapercha, cement, porcelain, all have their place, and it is here that I wish to make the oft-repeated statement that the first and highest qualification of the competent dentist is that he shall possess that ready judgment and that wise discrimination which shall enable him to judge rightly of the material best adapted to each individual case that is presented, and it is not intended, therefore, to champion the use of any one material to the exclusion of all others, nor to deny to each material its rightful place in dentistry.

Today we are experimenting with a new method of filling teeth —the cast inlay—and, like all other new methods that from time to time have arisen, we find men taking an extreme position regarding its use. If we are to be guided by a few of our excited confrères whose eyes have become so dazzled by that which is new that they can no longer see that which is old and has stood the severest test of time, then we are to very largely abandon the plugger and mallet, and adopt a method which requires us to destroy tooth structure where it ought to be preserved, cast our gold into an imperfect facsimile of the cavity, and afterward cement it, as best the circumstances will permit and for an altogether indefinite period, into a mutilated tooth.

Gentlemen, with what little influence I may have, I protest against it. With this as with all other new methods that from time to time have arisen, I occupy a conservative ground, nor have I ever yet had occasion to regret having done so. Quite early in my career I found here and there a man whose enthusiasm overstepped the bounds of reason, who acted upon the assumption that whatever was new was right, and that it must of necessity be right because it was new. From time to time I have witnessed the explosion of cherished theories which, in their brief day, occupied almost the entire attention of our profession. Cataphoresis—I dislike to mention its dishonored name; baked porcelain bridge work—it is practically a thing of the past; porcelain inlays—we see our profession

gradually receding, discouraged and dismayed; and now when these same gentlemen who advocated most strongly these very methods with which we met humiliating defeat—when these same gentlemen ask me to abandon the use of cohesive gold and to adopt for general use the inlay, in any form whatever, I reply, "No, I shall feel my way, I shall proceed with caution, until time, the only test we may safely apply, shall have proven the superiority of this method."

When we compare cohesive gold with amalgam, with gutta-percha, with tin, with cement, with porcelain, there is no ground for discussion. We are all familar with their qualities; we know their merits, their deficiencies, their limitations. I do not decry the use of any one of them in its proper place. Each is useful, each is indispensable, and were the question to arise that, were we to abandon the use of all materials save one, which material would we retain, there would indeed arise a problem not easy of solution. But, having all these materials at our command to be used when special cases would seem to indicate, there can be no question that cohesive gold, capable as it is of perfect adaptation, capable as it is of perfect anchorage; gold, unaffected by secretions and possessing all those superior qualities that have made it the great bulwark of operative dentistry, may safely be used in a very much larger number of cases than all other materials combined. Indeed, the superiority of gold is so evident, so well established, so satisfactorily proven by the test of time, that it seems to me this question narrows itself down to a question of the relative merits of cohesive gold as compared with the inlay, the latter being a cement filling in which the excess of cement has been forced out of the cavity by a fairly well fitting mass of metal.

In offering some criticism on the inlay I wish to be understood as deploring not the judicious use of this method, but its abuse. That the inlay has its place in dentistry no man will dispute; that it has a very great field of usefulness cannot be denied; but it is a fact which, in my opinion, is deplorable and alarming, that we find among our number men who urge, in the most positive manner, the practically universal use of the inlay to the exclusion of all other methods. This tendency has become much marked since the advent of the cast inlay, a method which, according to the manner in which it is used or abused, offers opportunity for the most ideal

and at the same time the most reckless dentistry that has ever been practiced in the whole history of our profession. It is a still more deplorable fact that those men who hold such extreme views regarding the use of the inlay are, for the most part, men of influence, men whose opinions carry great weight. We must not forget that now and then there arises a genius for certain kinds of work. Successful as they may be themselves, they are not safe men to follow, and when I see the rapidly growing tendency to abandon the use of the mallet, I deem it my duty, with what little influence I may have, to sound a note of warning to the younger men of our profession, who are more liable to be misled than those of larger experiences.

The position I maintain is this—that cohesive gold, well adapted and well condensed, is, under any and all circumstances, the most perfect filling, and I admit of no exception whatever. I do not mean that there is no place for each of the other materials, but that cohesive gold is superior in all cases when it may be successfully manipulated.

And I further maintain that the only place for the inlay is in those extreme cases of contour and restoration where perfection with any material is all but beyond the reach of human skill, and I accept the inlay here, not as a perfect filling, but as the lesser evil.

I maintain again that while faulty manipulation may, and frequently does, occur in the use of any and all materials, yet the probability of faulty manipulation is far greater with the inlay than with cohesive gold, and that a man with a given degree of skill will have a larger percentage of failures with the former than with the latter.

I take the liberty of quoting from a paper read by Dr. C. E. Woodbury before the G. V. Black Dental Club of St. Paul in February, 1908: "An inlay from the beginning until it is cemented into the cavity is subject to accidents, which may or may not be discernible before it is set and the margins finished: A little fault in the burnishing of the matrix, a slight distortion in its withdrawal from the cavity, a slight warping or a little gold on the cavity side of the matrix;" or, in the case of the cast inlay, "A slight distortion of the wax model, either when removing it from the cavity or when attaching it to the sprue wire, a small imperfection in the cavity

side of the investment, a failure to cast perfectly sharp at the margins—any of these things may occur and not be noticeable until after the inlay has been set and the margins finished, when it is too late to correct the fault."

While it is not my purpose to maliciously attack any material or method, for, like each of you, I trust I am unprejudiced and am at all times searching for the truth, yet in advocating the use of cohesive gold it becomes my privilege to point out whatever I may regard as faulty in other materials, and I desire at this time to call your attention to what I regard as a very dangerous and many times fatal feature of the cast inlay.

It is a law as well established as that of gravitation and known to all, that metals undergo expansion when heated and a corresponding contraction while cooling. When, therefore, in the making of an inlay the metal is forced into the mold, contraction of the mass inevitably takes place.

For the purpose of satisfying myself what the practical effect of this contraction would be, I have, during the past few months, made a large number of inlays for cavities prepared in blocks of ivory. These fillings were made with every known machine and every known investment, and in each case, where the filling was of considerable size and the gold did not overlap the margins, the contraction was such as to leave a distinct fissure between the mass of metal and one or more of the cavity walls.

I ask you here to consider a very significant fact. When a large mass of metal contracts, such, for instance, as a steel rail, the most marked contraction is in the direction of the greatest diameter of the mass of metal. Applying this fact to the cast inlay, I found that in making a filling for a mesioocclusal cavity, for instance, there was a marked contraction at either the gingival or the distoocclusal wall, or both.

Can we compensate for this contraction, and if so, how may it be done? Our inlay friends will tell us that it may be overcome by allowing the gold to slightly overlap the margins and afterward polishing to a perfect marginal contact. Admitting that this process will entirely compensate for the shrinkage of the metal, or, rather, cover over the point of shrinkage, for it does no more than this, a great danger still confronts us, for if in polishing our filling we accidentally or through the necessities of occlusion cut through these

thin, attenuated margins of gold, we at once reach the main mass of metal where the contraction is most evident, and a broad line of cement is left exposed to the disintegrating action of the fluids of the mouth.

In conclusion, my impression of the inlay, either cast or made with a matrix, as far as at present developed, is that in the hands of a thorough and skilful operator, where all details are fully understood and mastered, and infinite care is taken, it may be used to advantage in cavities of very large size; but if put to general and extensive use and made to take the place of cohesive gold, there will result a mass of defective dentistry that will stagger our profession.

They tell us it is a rapid way to fill teeth. I take exception to this statement. In extensive cases, yes; but in all small and medium-sized cavities, and these constitute by far the greater proportion of our fillings, the inlay, properly manipulated, results in a loss of time rather than a gain. They tell us it is an easy way to fill teeth. This, in my opinion, is the poorest of all poor arguments. My experience and observation have led me to believe that in most instances easy dentistry is poor dentistry, and surely no conscientious man would sacrifice good work for any other consideration.

Therefore I contend for the use of cohesive gold as against the plastic because of those superior qualities so well known to us all. It is stable, and its results are accurate and definite. It stays where it is placed. It retains its form. It is not soluble in the oral secretions. And I contend for the use of cohesive gold as opposed to the inlay—first, because the anchorage of the latter is never perfect, and only in cases of complex cavities, where the dove-tail may be used, is the anchorage even reasonably safe; second, because it has not yet been demonstrated that cement is a safe material to secure an inlay in place, but rather the evidence is thus far to the contrary; third, because the inlay frequently requires the sacrifice of too much tooth structure, as well as the needless display of gold; fourth, because it is a process which from first to last requires a series of the most careful and delicate manipulations, the failure of any one of which results in the failure of the filling; and, fifth, because it offers far more opportunity for defective manipulation than does the filling made of foil.

Gentlemen, let us not be deluded, let us not deceive ourselves, let us not by any means abandon the inlay, but let us proceed with

the greatest caution until time and experience have given us a firm foundation upon which to stand, and taught us where, when and under what circumstances it may safely be used.—*Dental Review.*

A FEW STEPPING-STONES TOWARDS SUCCESS. By Algy F. Strange, D.D.S., Litchfield, Ill. I am well aware that a paper on this subject is a radical departure from the time honored customs of our annual meetings, as we usually spend all of our time discussing papers of scientific nature, but there having been so little said to us along this most important line, and it being the reward we are all endeavoring to reap, I am going to say something on this subject. I am tempted to do this by observing numerous men of our profession, who are rapidly approaching an age, where they must cease to operate at the chair, and who throughout a lifetime of hard work have been unable to accumulate sufficient to sustain them with comfort during their declining years.

I asked quite a number of our profession what they deemed a basis on which we might measure success in our profession, and they were all of the opinion that the man who regularly gets the largest fees, and continues to do so, is the man who should be termed successful. I agree with them, that one of the requisites is to make money, but by no means the only one. From a financial standpoint our profession might be divided into two classes. One a class of professional dentists, the other a class of commercial men practicing dentistry. A professional dentist always remembers the "Golden Rule" and performs only those operations for his patient that he would under similar conditions want performed upon himself. A commercial man practicing dentistry does what his patients want him to do, whether it is extracting a first molar, a protruding cuspid, crowning a sound anterior tooth with gold, or other equally illegitimate operations, anything to get the *almighty dollar.*

The dentist who can practice and not juggle policy and principles, has accomplished a feat seldom attainable, in fact I doubt if it is ever done continuously, still it is one thing above all others on which we should measure success. Too many dentists of today sacrifice their self-esteem for the whim and prejudices of their

patients, they fear to take a firm stand and stick to it. Remember that fear is itself a kind of anticipation, nine-tenths of which never materializes. Do not hesitate; you know what is best for your patient, or should know. Tell him and have the ability to stick to your decision, restoring confidence in the mind of your patient.

You can never handle your patients until you learn to govern yourself. Our patients as a rule may be said to be ignorant as to what is best for their needs, and come to us for advice—some come to advise. No profession has made the progress in the same length of time as that of ours, and our patients have not kept up with the advance, and many of them do not know that the saving of their natural teeth is worth more to them than artificial dentures.

I experience almost weekly cases in which patients present themselves with the request to have probably 10 to 20 good teeth extracted, to have artificial ones made. I am proud to say that with few exceptions I am able to convince them that it is to their interest to save their natural teeth. The ignorance on their part can be excused when we take into consideration that there are practitioners in almost every locality who might be termed 40 years behind the progress of the times, and who know nothing or little regarding crown and bridge work, nor the use of inlays as preservers and restorers of lost teeth, and who through their ignorance and the fact that they are not capable of doing that class of work condemn it and teach their patients to prepare themselves as early as possible for artificial teeth. The age in which we live is so prolific in changes and inventions that even a radical departure from established rules and usages has become to be regarded as a matter of course.

The progress of the preceding generations is used only as a base for greater achievements and discoveries. That which excited wonder a year ago is now too common for comment and the luxuries of yesterday have become the necessities of today.

That we may keep up-to-date we should attend our local and state dental societies and take an active part in their proceedings, gathering all the new ideas and methods, putting into practice all we find of value. The dentist who opposes the introduction of a new man into his locality and condemns all new ideas and methods which he himself is incapable of putting into practice, is doomed to

a gradual and sure defeat. Men succeed only as they are able to utilize the services and ideas of other men. Spend your spare moments in study and research; remember that those who practice entirely what they are taught, with never a scruple nor a query, signify nothing in the intellectual life of our profession. Successful men are those who have harkened to opportunity. Some have a college education, others not. If you can earn your own living and also produce a surplus, adding to the wealth and happiness of the world, you are fit to be called a successful man. President Eliot of Harvard says "College cannot educate a man; all they can do is to supply opportunities. You can lead a boy to college, but you cannot make him think. Opportunity knocks at each man's door, but if you yourself are knocking when she calls, you will not hear her."

Never be entirely satisfied; always strive for better results. Only the dead are satisfied and they would not be if they were conscious of their dissatisfaction. Shed no tears over your lack of early advantages; no really great man ever had any advantages that he himself did not create.

Give each patient your whole attention, with just as considerate attention to a small job as a large one. Elbert Hubbard says "Most anybody can do business well, many men can do business very well, a few can do business superbly well, but the man who not only does his work superbly well but adds to it a touch of personality through great zeal, patience and persistence, making it peculiar, unique, individual, distinct and unforgetable is an *artist*, and this applies to all and every field of human endeavor. It is the last indefinable touch that counts—the last three seconds he knocks off the record that proves the man a genius."

Learn from your mistakes. Those who make no mistakes seldom do anything else. Do not lose any sleep over them; we best redeem the past by forgetting it. Do not disparage rivals, nor criticize your competitors' ability or methods. If you do not know what to say, say nothing. To repeat an unkind remark, is as bad as to invent a lie. Always be circumspect and courteous. Do not give your patients sharp, flippant answers, even though they be stupid or impudent; it is a great mistake. Meet rudeness by unfailing patience and politeness and see how much better you will

feel. Do not contradict your patients; bear the faults of some, the responsibilities of others and pardon everybody sooner than yourself. I have never forgotten a remark made by Dr. Marshall to my class the year I was a senior. He said: "Make each operation you perform a little better than every preceding one of a similar character." I don't know as I have ever had any better advice, and we should each try to follow it. Abraham Lincoln once said: "I do the best I know how, the very best I can, and I mean to keep on doing so until the end. If the end brings me out all right, what is said against me won't amount to anything; if the end brings me out wrong, ten angels swearing I was right would make no difference."

We should use more system in our business, keeping an accurate account of all receipts and expenses, making it a rule to settle all bills, local and foreign the first of each month, collecting in a like manner our own accounts. I have lost patients solely through the desire to accommodate, neglecting to collect, the bill being allowed to run until the person is ashamed to meet me on the street. When needing more work they go elsewhere for the sole reason that they are ashamed to come to me when they are already owing me, while if the bill had been presented and collected promptly they would have remained my patients.

Take advantage of all discounts for cash; it's like finding money. Failure is a habit; ask your banker. There are men always ready to quit. Men who are in the habit of letting their notes go to protest, do, and those who acquire the habit of being on time, are. You do not have to be a college graduate to acquire the habit of being on time and keeping your word. Few people know this, but it is so.

We should all endeavor to live up to the standard of ethics as taught us in college and as given us by our state and local societies. When asked why it was unethical to advertise, Dr. Black said: "Because we as professional men are not selling goods, but personal service. If a professional man advertises he must advertise his personality. This is an egotism which causes rebellion in the minds of all fair thinking people and lowers the man in their estimation." The public are rapidly learning that if they want

work well done, they must select a busy man—the other kind hasn't time.

You yourself know what your services should be worth, and do not be afraid to value them too high. The most expensive things in the world are those you get for nothing. Dr. Tilden once said "there are thousands of people in the world, poor, miserably poor, and keep constantly in this state by their desire to get something for nothing."

Do not use cigars nor alcoholic stimulants at a time that it may be noted in your practice, and if not used at all, the more sure you will be of success. I once heard a cigaretist defined as one who is late every morning and fresh every evening. Prosperity not earned is like good cheer gathered from drink and drugs.

This exposition would not be complete without a few maxims that I find of service as stepping-stones toward success. They are mostly by Hubbard, but I consider them worth repeating and remembering.

Responsibilities gravitate to the man who can shoulder them and power to the man who knows how.

The things we fear, we bring to pass.

A dead fish will float down stream, but it takes a live one to swim against the current.

The cheerful loser is a winner.

The leader of the orchestra is a man who has played second fiddle.

When in doubt, mind your own business.

Before you can manage others, you must learn to manage yourself.

Experience is the germ of power.

Folks who never do any more than they get paid for, never get paid for any more than they do.

Let your dress be quiet, neat and not too fashionable; to have a prosperous appearance helps you inwardly and helps your business.

Try these: A kind thought, a kind word, a kind deed.

Lastly, the most precious possession in life is good health. Eat moderately, breathe deeply, exercise out of doors and get eight hours of sleep.—*Dental Era.*

THE X-RAYS AND THEIR APPLICATION TO DENTISTRY. By Sidney Lange, M.D., Cincinnati, Ohio. Medicine and dentistry have so much in common that a knowledge of one branch necessarily implies some idea of the basic principles of the other, and I feel that in my special work I stand upon common ground, common to both dentistry and medicine.

Oral pathology does not differ from the pathology of other parts of the body, and the methods employed for one region are the methods to be used in the other. But our chief method of investigating pathology is by post-mortem study. We see by post-mortem examination only the end result of the disease. Pathologic changes in living tissues give evidence of their presence by the perverted function of these tissues, and the chief importance of these pathologic changes to us is the disturbed function which accompanies them. Dead tissues do not functionate; therefore the dead have no diseases. Pathology is best studied in the living. And it is my purpose this evening to call attention to a method of studying gross pathology in the *living* tissues, a method that is not new by any means, a method that dates back twelve years from the beginning of the Roentgen era.

The X-ray may be defined as that form of radiation (energy) which emanates from a highly exhausted tube when a high tension current is sent through that tube.

Discovery of X-ray.—While the actual discovery of the ray occurred in 1895, the series of scientific events which led up to the production of the X-ray dates back to 1650, when Otto Von Guericke made the first air pump. In 1838 Faraday produced the secondary or faradic current. Here we have the two essentials for the production of the X-ray—an air pump to produce a vacuum and an electrical machine to generate a high-tension current to send through this vacuum. Ruhmkorf, in 1851, made the first induction, or Ruhmkorf coil, the type of apparatus we use today for energizing our X-ray tube. Geissler, in 1859, using the Ruhmkorf coil, studied the effect of passing a high-tension current through a vacuum tube. But the degree of vacuum necessary for the production of the X-ray was not obtained until Herman Sprengel, in 1865, invented the mercury air pump, by means of which high rarefactions can be produced with comparative rapidity. Physicists now began in earnest the study of electrical discharges

in rarefied gases, which researches culminated in Roentgen's discovery, thirty years later. Sir William Crookes, in 1875, exhausted tubes down to one-millionth of an atmosphere pressure, the required degree of vacuum for the production of the X-ray, and he undoubtedly produced the X-ray at that time, although unaware of it. Hertz and Lenard, in 1894, showed that the rays emanated from high vacuum tubes would penetrate aluminum, but it remained for Wilhelm Conrad Roentgen to discover that the rays emanating from a high vacuum or Crookes' tube, when a high-tension current is sent through it, would penetrate all things, and would affect the photographic plate.

X-ray Described.—Modern physicists are leaning more and more to the idea that all matter is ultimately made up of the same constituents; that the different forms of matter, as liquids, and solids, heavy substances and light substances, owe these characteristics, not to any essential difference of composition, but solely to the number, arrangement and amount of motion of the ultimate particles making up the atom, the atom being divided into smaller particles called electrons. And it is these vibrating electrons that give rise to the manifestations termed radiant energy.

A slow rate of vibration (75,000,000 per second) produces electromagnetic waves. An increase in rate produces heat waves. Another increase, and light waves appear. Continued acceleration of the rate of vibration of the electrons produces, successively, ultra violet or Finsen rays; then cathode or radium rays, and finally the X-ray. This ray we cannot perceive directly. It gives neither heat nor light, and we recognize it only by its effect upon the fluorescent screen and photographic plate. It is neither deflected, reflected nor polarized, and it penetrates all matter in inverse ratio to its mass or density.

Since these rays are so strange in penetrating all things because of their tremendously rapid vibrations and short wave lengths, and so strange that we need a sixth sense to perceive them, it follows that they should be produced in a strange manner, in a strange place. In order to excite such exquisitely rapid vibrations, all source of resistance must be removed. Therefore, we exhaust a tube to one-millionth of an atmosphere pressure. There are so few gaseous particles left in the tube that when a high-tension current is passed through, negatively charged, electrons fly off from the

cathode at a tremendous velocity (calculated to be one-third that of light), there being scarcely any resistance in this almost perfect vacuum, and, striking the anode or target, set up vibrations which Roentgen called the X-ray.

Surely this is an auspicious epoch for science. The discovery of radium and its marvelous attributes by the Couries has upset our ideas concerning the entire physical universe. We find all matter unified, the universal unit being the smallest subdivision of the atom. We find the atom to be a veritable storehouse of energy waiting to be tapped. If we could but release this intra atomic energy, steam, as a source of power, would become obsolete. We find our ideas of the conservation of energy and conservation of mass challenged, but, most remarkable of all, we find that alchemy is no mere dream, but a reality. The ancient alchemists have become modern chemists; the modern chemist has become an alchemist. Transmutation of radium into helium, copper into argon and lithium has been observed. We are but waiting for the transmutation of base metals into gold.

Radiographs.—The application of the Roentgen ray to medicine and surgery followed rapidly upon its discovery. The first X-ray picture of the teeth was exhibited by Professor Koenig to the Society of Physics at Frankfurt, Germany, in February, 1896, only two months after the discovery of the ray. In April, 1896, Walkof demonstrated many radiographs of the teeth. In June, 1896, seven months after discovery of the ray, an article appeared in the *Dental Cosmos,* by Dr. W. J. Morton, entitled "X-rays in Dentistry."

But several reasons conspired to prevent the rapid universal adoption of the Roentgen method in medicine and oral surgery which its value merits. In the first place, the early machines were inefficient and the time of exposure was very long. We read of the early exposures for kidney stones lasting for one to three hours. With these lengthy exposures X-ray burns were frequent, and this created a prejudice against the use of the ray. Today no exposure need exceed thirty seconds, and in the case of children who may be frightened, or who cannot be made to remain quiet, a picture may be made almost instantaneously by a single flash. An X-ray burn as the result of such short exposures is entirely out of the question. The early pictures were poor and lacked definition. Today we understand the importance of securing sharp, clear detail by

the use of the so-called compression cylinder, which cuts out all the side lights.

Furthermore, many are skeptical concerning the value of the ray, because their acquaintance with X-ray pictures is confined entirely to the half-tone reproductions seen in our journals, or to lantern slides. It is a well-known fact that neither half-tone nor lantern slides do justice to X-ray pictures. The original negative itself must be examined, and very carefully and in a proper light.

The great problem today is the correct interpretation of the X-ray picture or radiograph. The technique involved in the making of the picture may be easily acquired, but the interpretation requires considerable experience. A layman may be able to prepare a pathologic slide and view the same through a microscope, but the eye of the pathologist is necessary to correctly interpret the picture. An X-ray picture is never wrong. If error exists it lies in the interpretation. The picture has no intrinsic value. It is of value only in the hands of one able to interpret it correctly.

We must, once for all, remember that a radiograph is not a photograph. As its name implies, a skiagraph is a shadow picture, not an image; simply a record of the varying densities of the part through which the X-light has traversed. If these structures are of uniform density we get a shadow of uniform density. Since the radiograph is simply a shadow, it may be altered and distorted at will by varying the position of the light. Such distortion must be considered in interpreting the negative.

When the ray traverses bone we get a shadow of the structure of that bone. Any alteration in structure is at once evident upon the plate. We thus have a means of studying, intra vitam, the gross pathology of the bone. We can recognize upon the radiograph bone-atrophy, bone-hypertrophy, bone-inflammation, necrosis, abscess formation, sclerosis or tumor formation. So accurate is this record that few surgeons will operate upon bone or joints without first obtaining a radiograph of the part as a guide. These statements should hold true for the bones of the mouth as for bones in other parts of the body. The bones of the face are comparatively thin and very accessible. The chief difficulty is due to the fact that if the plate or film is placed externally we get a superimposition of shadows. This may be avoided by inserting a small film within the mouth and holding it in place with the fingers. To

protect the hand a ray-proof glove may be worn. Such a glove has been devised by Dr. Price of Cleveland.

Method of Holding Film in Place.—To avoid the inconvenience of holding the film in position with the fingers, I have been in the habit of taking an impression of the jaw with modeling compound, and, after hardening in cold water and trimming it, I reinsert it in the mouth with the film upon it. The patient, by closing the teeth upon the wax impression, holds the film firmly in position. If he moves his head slightly the film moves with it, and no blurring of the picture occurs. Only two or three teeth can be correctly shown upon each radiograph. Owing to the curvature of the jaws, only the two or three teeth perpendicular to the path of the ray can be shown undistorted. It is a mistake to attempt to take the entire arch upon one film.

Protection from the Ray.—The question of protection from the harmful effects of the ray is an important one. The patient is amply protected by the modern compression apparatus, or by tube shields, but the operator who is daily exposed to this mysterious radiation should be shielded from the direct rays by a lead screen, or both. Much uncertainty exists as to just how harmful is the influence of the ray to the operator who exposes himself to minute doses day after day, and month after month. We no longer burn our hands, because we no longer hold our hands up to the tube to determine how penetrating the rays are. There are many other ways of determining the penetrating power of the tube, which, because of their technical nature, I will omit.

Outside of such a burn to the hand, the only tangible injury which the Roentgen operator may sustain is sterility. It has been experimentally proven that an exposure of forty minutes to the testicles of the guinea pig destroys the germinal epithelium, which results in azospermia, an absence of spermatozoa from the semen. This has been observed in many X-ray operators. The sterility is not accompanied by any change in the sexual function, and may again disappear if the proper protective measures are observed, providing the atrophy of the germinal epithelium has not proceeded too far. Just why the testicles should be so affected is probably because of their superficial position, and because of the delicacy of the germinal epithelium. Whether the X-ray operator will suffer serious damage to other parts of the body, time alone can tell;

therefore, it is a part of wisdom to exercise due caution, knowing as we do the profound influence of the ray upon cell structure and cell activity.

The Fluoroscope.—The value of the fluoroscope, or fluorescent screen, has been largely overestimated in the past, and to its indiscriminate use many of the early errors in X-ray work may be directly traced. The image produced upon the fluorescent screen is hazy and indistinct, and not at all comparable to the fine quality and detail of the picture which is obtained by the photographic method. Good fluoroscopes are difficult to obtain and very expensive, and all of them deteriorate rapidly from the effect of heat and the X-light. Furthermore, in using the fluoroscope we are exposing ourselves and our patients to unnecessary danger. A picture may be made in five seconds, but if we use the fluoroscope we are tempted to expose ourselves ten or fifteen minutes, or longer. For the above reasons I never use the fluoroscope except to examine the chest, where it is desired to study the motile phenomena of the thoracic viscera, such as the pulsation of an aneurism, the extent of the excursion of the diaphragm, etc., and I do not believe that the fluoroscope has any place in dentistry.

X-ray in Dentistry.—The application then of the X-ray to dentistry depends upon the fact that substances of different densities are unequally transparent to the X-ray. Thus metallic fillings appear as black masses; the root fillings as somewhat less dense streaks; the enamel and dentin are next in density; while the root canal shows plainly as a light channel in the dentin, and the alveolar process and maxillæ show their fine uniform cancellous structure in various degrees of density, depending upon their thickness. The entire field from the crown of the tooth to the base of the alveolus can thus be minutely studied.

The simplest application of the ray is for the detection of unerupted, impacted and supernumerary teeth. We have in these subtle rays a means of studying dentition from its beginning in the sixth week of fetal life to its completion in the twenty-first year. We can detect the formation and gradual growth of the enamel germ, which finally enlarges to form the crown. Then the point-like projections appear (the primitive roots), which gradually elongate and inclose the root canals.

In studying this subject it occurred to me that abnormalities in

the second dentition might be foretold before they appear by a study of the unerupted teeth in the child's jaw. I wondered, if by a Roentgen examination during some of the acute infections of childhood, we could detect disease or destruction of the unerupted tooth-germ, and thus predict an absence or a malformation of one or more of the permanent teeth. From a hasty survey of the literature, I do not believe that a systematic X-ray study of the child's jaw has been recorded. In the *Journal of the New York Institute of Stomatology* (December, 1906), Tousey attempts to establish the value of the X-ray study of unerupted teeth by radiographing one hundred children, and measuring with accurate calipers the breadth of the crowns of the unerupted teeth. He infers that the size of the unerupted crowns will give some idea as to whether there is sufficient space in the free border of the alveolus for their eruption, and calls attention to the fact that a very small deciduous tooth may be followed by a very large permanent one, and *vice versa*. But Tousey fails to take into consideration that the alveolar arch is constantly enlarging during this period to make room for these larger teeth. By accurate measurements he shows also that the size of the teeth upon the radiograph corresponds very closely with the actual size of the teeth, the enlargement upon the radiograph being inappreciable.

Impacted Third Molars.—Interest in connection with non-erupted and impacted teeth centers about the third molar because of the great frequency of this complication. Kells reports a case of four impacted molars in the same patient. There is much literature extant concerning the diagnosis and treatment of an impacted third molar. In the older text-books the student is instructed to "probe with sharp steel points, and thereby get the location and character of the tooth." But these teeth are often covered by dense bone. The removal of the second molar is sometimes counseled in the treatment of this condition; in some cases the removal of both second and third molar. Cryer states that an impacted molar often causes great distress by initiating inflammation, which often includes the temporomaxillary joints and the soft parts of the mouth, preventing mastication and deglutition, and one of two things must be done, either the offending tooth, or the one in front of it, must be removed. Kells

insists that such symptoms do not occur in a *young* individual, but can only result from *continued* pressure of the impacted tooth over a *considerable period* of time, and he, therefore, concludes that an impacted third molar should be diagnosed by a radiograph in its *early eruptive* stage, and removed without delay. Such a picture will safeguard the possibility of leaving a small piece of root in the alveolus to cause trouble at a future time. Aside from showing the presence and position of such abnormally placed teeth, the X-ray will influence the treatment of the condition by showing the exact nature of the roots of these teeth and the direction in which they point. In connection with unerupted teeth a shortcoming in the Roentgen method of examination has been met with. The X-ray picture is a flat surface, *i. e.,* it shows the relations of the teeth in only two dimensions. In other words, having located an impacted tooth it is impossible from the picture to say whether the tooth lies nearer the lingual or the buccal surface of the alveolus, a point which may have a bearing upon the subsequent treatment. A stereoscopic picture which supplies the third dimension has been recommended to overcome this difficulty.

X-ray in Orthodontia.—In orthodontia the value of the ray can hardly be overestimated, for it gives the operator a survey of the field in which he is to work, and he can draw his plans according to the conditions found. It will show the presence and position of unerupted teeth, or it will register their absence. It will show the length and direction of the roots of the teeth and the amount of space between them. It will show whether the root is only partially developed and opened at its tip, or it will show the root to be fully formed with a small apical foramen, a point which may influence the subsequent corrective procedure. It will settle the question as to whether a tooth is permanent or deciduous; it likewise will show the extent of absorption of the deciduous root.

X-ray Examination of Tooth Roots.—Of next importance from the X-ray standpoint is the study of tooth roots. You will note upon study of radiographs of normal teeth that the root is smooth in contour, although grossly it may be variously curved, that the cancellated alveolus hugs the tooth closely, and that the bone structure between and above the teeth is uniformly mottled or

stippled. A pericementitis is evidenced by a light space between the root surface and the alveolus. Abscesses about the tip of the root, or in the alveolus, are, likewise, recognized by light spaces in which no cancellous structure can be made out. How often do you have evidence of abscess without being able to localize same, or to recognize the offending tooth? Even though a sinus exists it may be impossible to trace its origin. As absolutely typical of this class of cases I have taken the liberty to quote from Schamberg the following clinical history:

"Radiograph No. 11 shows an incipient abscess upon the root of a crowned bicuspid tooth. Prior to taking the picture there was no definite means of determining which tooth was at fault, for all the teeth in the vicinity were equally tender, and there was no evidence upon the gum of the trouble that was ensuing within the alveolar process. The patient was almost frantic with pain. Upon examination of the X-ray negative it was noted that the area of tissue destruction was small and located at the end of the bicuspid root, the canals of which were well filled. The patient was placed under nitrous oxid, and an opening through the gum and alveolus was made, and the abscessed area curetted. Relief from pain was immediate and the healing prompt." He adds further, "It has become an invariable rule with me to take a radiograph of every chronic abscess before performing the operation, and occasionally I take a second or third radiograph to note the progress of the case." It occurred to me on reading Schamberg's article that even though the abscess be located an X-ray picture would be serviceable in showing whether the root was involved or whether the trouble was confined to the alveolar tissue, and consequently might indicate whether the condition could be treated through the root canal or whether through the alveolus, and if through the alveolus whether a simple curettage would suffice, or whether apical excision would be necessary to eradicate the infection. Furthermore, if excision of the root be decided upon, the radiograph might show how much of the root to remove. In those cases in which the pus has burrowed through the tissues and finally discharged some distance from the original site of the infection, the resulting sinus may be tracked to its origin by injecting into it an emulsion of bismuth-subnitrate (an

inert powder), and then radiographing. This method has proven valuable to me in other regions of the body.

In a general way the strength of a tooth can be estimated from a radiograph of its root. Such a knowledge would be of value in determining the position of anchorage for bridge work, or in placing crowns. Kells recommends placing lead or platinum pins in position, and then radiographing in order to determine whether they are the proper length. Since absorption of roots may occur from disease, or even idiopathically, the integrity of a tooth can be ascertained by a radiograph before undertaking corrective or operative measures of any sort. Mechanical strength of a tooth depends for the most part upon the health of its root and surrounding alveolus, but it is possible that such physical characteristics as shape and length of root may indicate the strength of the tooth.

Root Fillings.—Inspection of root canals and root fillings can be easily carried out by the Roentgen method. Broken off instruments or foreign bodies may, of course, be easily located. Because of fused, bifurcated or curved roots, the root filling often fails to reach the tip.

Lewis has shown that ordinary root fillings, gutta-percha or chloropercha, show plainly upon the radiograph even to the tip of the smallest root canal.* In the *Dental Review* of July, 1906, he says, "In 90 per cent of cases of abscess that I have radiographed improper and short root fillings have been apparently the direct cause, and the radiograph has shown the apex of the root to be unfilled." Except with the X-ray one cannot always tell with certainty the direction or the thickness of a root, and, therefore, the enlargement of a root canal should be very carefully proceeded with. In the cases I have seen curvature of roots has been not the exception, but the rule, and enlargement of such canals, with the so-called Gates-Glidden drill, seemed mechanically impossible. The radiograph will, of course, show a perforation of the root by such a drill. Would it be, perhaps, ultrascientific

*A guttapercha point will show plainly in a radiograph, but it is questionable whether the thin film of guttapercha resulting from a solution in chloroform will show. Too much dependence, therefore, must not be placed on a radiograph in determining whether or not a root is properly filled.—Editor, DENTAL DIGEST.

to suggest the aid of the radiograph in all operations upon root canals?

In the various manipulations upon the root canal the dental surgeon is working more or less in the dark. In cleaning out such a root canal, owing to the varying shapes and lengths of the roots, it may be impossible to determine whether or not the apex of the root has been reached. By inserting a fine brooch and radiographing the tooth with brooch in position, this point may be cleared up. In drilling out a root for the insertion of a pin, or post for an anchorage, this same procedure will tell whether you are drilling in the right direction, and whether deep enough or not.

I quote the following case verbatim from Kells in *Dental Review:*

"A patient presented himself with sore lower bicuspid, which contained large defective filling. He stated that the tooth had been filled five years ago and that it had caused pain occasionally since then. According to rule, all such cases are immediately radiographed that no valuable time may be wasted, and the method of treatment is determined upon only after the conditions within the root and its apex are learned. The picture showed a root filling extending only one-half the length of the tooth, the lower half being devoid of any filling whatever. A pus pocket was shown at the end of root and upon its mesial aspect. Upon removing the filling considerable blood and pus exuded. Patient stated that the dentist had previously used a drill in root. A lead post was inserted and the patient was again radiographed and the picture showed that the root had been drilled through."

Pulp Stones.—Fillings which encroach upon or enter the live pulp cavity may be the exciting cause of much local disturbance and reflex pain. A radiograph may aid in clearing up such obscure cases. With regard to pulp stones Tousey claims to be able to show them upon the skiagraph, although Saterlee has never been able to demonstrate them. Lewis claims that pulp nodules can be shown by regulating the tube vacuum to suit the part to be skiagraphed. The refinement of technique that makes such diagnoses possible is the result of the improvement of X-ray apparatus in the last few years, and the study given to this work by Roentgen specialists.

Exostoses of roots, necrosis and tumors of the maxillæ, frac-

tures of the maxillæ and dentigerous cysts, all come in the field of Roentgen diagnosis. Dr. Case reports the recognition, by means of a radiograph, of an odontoma which prevented the eruption of a permanent tooth.

X-ray in Pyorrhea Treatment.—An enumeration of the applications of the Roentgen ray would not be complete without a reference to pyorrhea alveolaris. My personal experience with this obstinate condition is extremely limited, and what I shall say concerning it represents simply what I gather from a brief review of the literature and from conversations with various members of this society. There seems to be some difference of opinions as to whether or not the X-ray can be applied to this condition for diagnostic purposes. But since we know that this disease is associated with absorption of the alveolar processes, with pus pockets about the roots of the teeth, with necrosis of roots, with alveolar abscesses and with deposits about the teeth, all of which lesions can be demonstrated upon the radiograph, the ray would seem to have an important bearing here, not for purposes of diagnosis entirely, for the disease is usually self-evident, but rather as an indication for relief of the condition. For the radiograph will show just how advanced the disease may be, will show the location of the pus pockets, the necrosed roots and the deposits about the teeth. The question as to whether the ray can show the deposit and excrescences about the roots has been much discussed.

Dr. Rhein made the following assertion before the National Dental Association: "It is impossible for any deposits to be on the teeth that the radiograph will not show." Tousey corroborates this statement. Schamberg, on the other hand, says that the deposits cannot be detected. He adds, moreover, that the deposits upon the roots of teeth are frequently so minute that they are scarcely perceptible to the eye, even after they are removed, and still they are a source of irritation. That deposits of some size upon the roots of teeth will show, I can prove by a lantern-slide of some extracted teeth as well as by a case of pyorrhea. But even if they are too small to show upon the radiograph, the little pus pocket which results from their irritation will be indicated upon the radiograph, for there will be a small space between the alveolus and the tooth root at the site of the deposit, while normally the alveolus hugs the tooth root closely everywhere.

Dr. Rhein intimates that the ray may be used even in the differential diagnosis of pyorrhea, and he cites three instances, all of which I shall quote.

The first was an experimental examination of a dead monkey. Regarding this case he says: "The director of the Rockefeller Institute in New York called my attention to the great amount of calculus deposit about the teeth of a monkey which had died at the institute, and I thought we had a good case of pyorrhea, so I turned the specimen over to Professor Bromell, and, to our astonishment, we found a normal alveolus. This illustrates what happens so frequently in practice where we see many cases in which the deposits are simply the localized expression of a constitutional disorder."

The second instance given by Dr. Rhein is as follows: A patient with a loose bicuspid was referred to Dr. Rhein as a case of pyorrhea, which demanded attention. The radiograph, while it shows an absolutely healthy condition of the osseous structure, presented one pathologic point—namely, that inflammation of the pericementum had existed, and that the looseness of this bicuspid was entirely due to local irritation brought about by a badly made gold shell crown, the exciting cause of the inflammation in the pericemental membrane. The removal of the pulp and the proper crowning of the tooth effectually cured the case.

Case three was a case "in which there was a loose lower third molar with deposits and pus, a type of case that a large portion of the profession would take for a pyorrheal case pure and simple. The X-ray picture revealed an amalgam filling entering the pulp cavity with no sign of the pulp ever having been treated. It was simply a case where the exciting cause was an improperly inserted amalgam filling which had caused the death of the pulp.

X-ray as a Therapeutic Agent.—Of the therapeutic application of the ray to pyorrhea much has been written, and I mention this phase of the subject simply to open the way for a discussion of the same. My experience with the ray in similar medical conditions would lead me to believe that it might be of value in the treatment of pyorrhea, not as a specific, but rather as an aid to other means of treatment.

At the Cincinnati Hospital we are using the ray to stimulate slow

suppurative conditions, such as indolent leg ulcers, suppurating glands, chronic eczema, etc. That the ray is not bactericidal, *per se*, is well established, but it does seem to favorably affect such indolent infections by stimulating the cells to react against the infection rather than by killing the germs. Favorable reports have been recorded by various men, unfavorable reports by others. Since the X-ray treatment of pyorrhea is at best only an adjuvant to other methods of treatment, its real value is, perhaps, hard to establish. It is true in medical work, and undoubtedly true also in dental work, that when we have exhausted all the ordinary drugs and remedial measures we resort to the X-ray, and in just such types of cases of indolent suppurative processes the X-ray seems to benefit probably entirely through its stimulating effect.

Reflex Lesions Detected by X-ray.—The X-ray has a bearing even upon the extraction of teeth, in so far as it will show the size and direction of the roots of the tooth, or it may show the absence of the germ of the tooth which is expected to take the place of the one to be extracted. Lewis says: "The dentist has a great advantage over the physician in that by means of the X-ray he can hold as good a post-mortem examination before extraction of the tooth as after, and he can profit by the knowledge so gained."

Its bearing upon obscure neuralgia is an important one, since we know that pain due to abscessed, impacted or misplaced teeth may be referred to any branch of the fifth nerve. Irritation of such teeth may be a factor even in the various mental disturbances. Just a few days ago a well-known ear, nose and throat specialist referred to me a case of pain behind the ear and over the mastoid cells, the cause for which the most painstaking examination of the ear would not reveal. A picture showed a misplaced third molar, the removal of which, I am informed, has relieved the condition.

Two cases of alopecia recently reported in a French journal were traced directly to the teeth, one caused by a retained root after extraction of the tooth, and the other by an abscessed tooth. The radiograph would have cleared up both conditions. Before undertaking any of the severer operations for the relief of intractable neuralgia, such as extraction of the nerve root or ganglion, an X-ray examination of the teeth is indicated to exclude peripheral irritation by the teeth. We are told that a tooth other-

wise normal in position may have one of its roots pressing upon the dental canal. This I found difficult to diagnosticate from the radiograph, because the picture is flat, and if a root appears superimposed upon the dental canal we cannot say whether it is placed to the buccal or lingual side of the canal. Likewise, in interpreting radiographs, we must remember that we are viewing only the mesial and distal contours of the tooth, and that deposits or an abscess, either on the root or in the alveolus, *i. e.*, to the lingual or buccal side of the tooth, may be overlooked because of the heavy shadow of the tooth, which is superimposed upon the abscess or deposit. Likewise, a root which is curving in a buccal or lingual direction may look perfectly straight (although shortened) upon the radiograph.

Examinations of the Sinuses.—It remains to speak briefly of the value of the ray in examination of the pneumatic sinuses of the face. By a method first used in Germany and later worked out in this country by Caldwell of New York, the antrum, ethmoids and frontal sinuses can be outlined upon the radiograph. The size, shape and position of these cavities can be ascertained and the relation of the teeth to these cavities can be established. Accumulations of pus in these cavities can usually be shown. The importance of the roots of the teeth, as an etiologic factor in antral infection, has been frequently brought out. In reviewing the relation of the teeth to the maxillary sinus, we are reminded that the floor of the sinus is situated over the first upper molar and bicuspid teeth, and may descend between the roots. The roots of the first upper teeth may extend so far upward as to form an uneven outline on the floor of the antrum, or in some cases the floor of the antrum may be absent over these teeth, leaving only the mucoperiosteum covering over the ends of the root. A properly executed radiograph should include the floor of the antrum, and should, therefore, reveal such conditions. A diseased root may readily be the cause of empyema of the antrum, likewise, a diseased antrum can secondarily infect a root which projects into it. But whether the root involvement is primary or secondary, of this much we are certain, that as long as the diseased root remains the antral infection will not subside. Therefore, nose and throat specialists will have occasion to resort to dental radiography to

locate such an offending tooth. In determining where to drain an antrum, since drainage is most perfect if we tap the cavity at its lowest point, the radiograph should play a part in such procedures. While the teeth are related anatomically only to the antrum of Highmore, the ethmoid, sphenoid and frontal sinuses are so closely connected with the antrum that it has been said that infection for one sinus means infection for all. Hence the importance of the teeth in *all* sinus infections.

Dr. Fossume, in the *Journal of the American Medical Association,* reports the following interesting case:

"A man about sixty years of age complained of a pain on left side of his face, especially at night. His family physician sent him to a rhinologist, who treated the post nares, as there was considerable discharge from the nose. As the last molar was particularly sensitive to percussion, the patient consulted Dr. Fossume, who tested the molar and found it normal. He then had a radiograph made. This demonstrated a small tooth located immediately in front of the sensitive tooth, which had remained *in situ* fifteen years. This root piece was removed, and, as it encroached upon the antrum, this cavity was opened in its extraction, a free flow of pus ensuing from the maxillary antrum. The case healed in three weeks."

Cryer's interesting work upon the congenital abnormalities in the size, shape and position of the antrum, ethmoid cells and frontal sinuses suggested to me the possible value of the ray in the recognition of such variation from the normal. His X-ray study of the temporomaxillary joint is interesting in this connection.—*Items of Interest.*

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Editorial.

THE IMPORTANCE OF A KNOWLEDGE OF ORAL PATHOLOGY.

There is perhaps no field in dentistry which needs to be investigated more thoroughly at the present time than that of oral pathology. Today there is a great demand on the part of the profession for advanced therapeutics; and one of the essential factors upon which therapeutics is based is a broad knowledge of general pathology and a special knowledge of oral pathology.

We have men who are laboring diligently in this special field; and as a result much light is being thrown upon the knotty problems associated therewith. Still, the average dentist is greatly in need of further light along pathologic lines. Take, for instance, the phase of pathology known as *infection;* and how few, when an abscess develops, search for the real cause! Far too many dentists treat the case blindly, applying drugs without knowing their specific action, and with little knowledge of the real pathologic condition they are endeavoring to correct.

To understand the mode or modes of infection one must at least possess a working knowledge of bacteriology. It is generally supposed that when infection occurs in a certain part of the body, bacteria have entered through an abrasion or wound. This is not necessarily so. There is scarcely a dentist who has used pressure anesthesia in his practice to any extent but who can recall cases where infection followed the removal of the pulp or the filling of the root, although every precaution was taken to prevent this result in performing the operation. When infection follows, the general opinion prevailing among dental practitioners is that bacteria were introduced in the removal of the pulp or in filling the root. While

this is far too often the case, due to carelessness on the part of dentists, yet pathology teaches that it is not necessarily true. For example, in the case of infection of the pericemental membrane following pressure anesthesia, the cocain hydrochlorid, a protoplasmic poison, may have lowered the vital resistance of the cells, and the bacteria present in the tissue, through the medium of the blood or lymph, take an undue advantage of the crippled cells and infection follows.

Accepting the theory of pathologists that infection is due to the presence of bacteria, we find that an abscess may be caused in two ways: Either by introducing the germs through a wound or by those already present in the tissue. There is a debatable question among pathologists as to whether bacteria are normally present in the tissues of the body. A most excellent paper on this subject is found in this issue of THE DIGEST, page 996, by Dr. J. G. Adami of McGill University, Montreal, to which our readers' attention is specially directed. Bearing on this point he says: "A long series of experiments upon the mode of prevention of intestinal adhesions has afforded an interesting example of the free migration of bacteria in the tissues of the body. Setting up the mildest grades of aseptic irritation of the peritoneal cavity, it has been found that, notwithstanding all precautions, the majority (66 per cent) of the recent fibrinous adhesions gave cultures or gave microscopic indication of the presence of bacteria. What does all this indicate? This, I think, that we must not presume that every infection is necessarily preceded by some relatively gross surface lesion; what is termed *cryptogenic infection* may well be much more common than is usually held to be the case. So also—though this must seem to be a dangerous doctrine to enunciate—that not all infective surgical complications are due to the entrance of germs through the wound. The lesson to be learned here is assuredly not that of carelessness in the treatment of surgical wounds, but increased care in the preliminary 'toilet,' so-called, of the surgical patient. If, as these observations seem to indicate, such bacterial subinfection occurs most commonly through the walls of the alimentary canal, then the nearest approach to actual sterility of the tissues is to be gained by placing the bowels in the most healthful state, nay, by a complete flushing out of the bowels prior to operation. Empirically the surgeon has already learned the wisdom of this course."

Not only do surgeons generally recognize the importance of placing the bowels in a healthful state, but many leading surgeons insist upon a healthful condition of the oral cavity before performing an abdominal operation. The mouth is a hot-bed for micro-organisms, and while it is impossible to keep it in what is technically known as a sterile condition, yet all hopelessly decayed roots can be extracted, mechanical irritants, such as tartar, projecting fillings, ill-fitting crowns and bridges, etc., can be corrected or removed, and the patient advised to use an antiseptic mouth-wash and thus prevent the rapid proliferation of mouth bacteria.

If further evidence is necessary to impress the reader with the importance of a knowledge of pathology, his attention is also directed to an article by Dr. W. H. G. Logan, of Chicago, in this issue, page 971. In this article Dr. Logan shows in a most practical manner how necessary it is to understand the pathologic changes through which the pulp tissue is capable of undergoing. The Illinois State Dental Society has a committee that is working on an outline for a postgraduate course of study for its members, the course to include, among other subjects, oral pathology. For several years the Iowa State Dental Society, largely through the efforts of Dr. Conzett, has had its members grouped into study clubs, from which much benefit has been derived. This year a certain group of members is to take up the study of oral pathology.

The work of state societies should be encouraged along these lines to the end that dentists generally may not only appreciate the importance of oral pathology, but that they may become *readers* and possess at least a working knowledge of this branch of medical science.

SHOULD PROFESSIONAL MEN PAY COMMISSIONS?

The question of commissions among professional men is one that should require no space for discussion in dental literature, for to give commissions should be beneath the dignity of any professional man. We regret, however, to find that conditions are such in certain parts of the country as to justify the expression of an honest opinion on this most demoralizing subject.

This is an age of specialism. Men are specializing in dentistry as they have been in medicine for a number of years. When a practitioner gradually drifts into the practice of a specialty, the

question which naturally arises is, How can a sufficient number of patients be obtained to maintain him in the special work? The one unequivocal answer should be to render the very best service possible, be he engaged in orthodontia, the treatment of pyorrhea, the extraction of teeth, or any other specialty. There is room at the top in any walk of life and no practitioner should engage in a specialty unless he has thoroughly prepared himself to do the work; and having done this any man or woman can succeed if he is honest, capable and deserving.

Those specialists who give commissions endeavor to justify the act by arguing that the dentist who refers the patient spends more or less time in having the patient go to the specialist and, therefore, has earned his commission. This is, indeed, a thin curtain behind which to hide. Take, for example, the case of a child in need of orthodontic work in a family all of whom are patients of a general practitioner. If the latter has not the ability nor the time to regulate the teeth for that child, he owes it to the family to refer the case to a specialist who is capable and honest; and, furthermore, if he feels that he has rendered a service to the patient in the way of consultation and advice, for which he is entitled to a fee, he should be man enough to demand the fee himself and not expect to get it in an underhanded way through the guise of a commission from the specialist to whom the patient was referred. In plainer English, let us say that if the dentist does not possess the courage to tell the patient that he owes him a fee, it is *graft* in its most flagrant form to accept it in any other way. Both the specialist and the dentist who accepts the commission are equally guilty; for, as Dr. C. N. Johnson says in an editorial in the August number of the *Dental Review*: "This bid for patronage on the part of a specialist is equal to a tacit acknowledgment that he has not the ability to win his way on merit."

In a letter to the alumni of the Angle School of Orthodontia, Dr. Norman W. Kingsley said:

"Bear in mind that you are engaged in a profession, not in a trade. The education, culture and customs of civilization all accord superiority to the learned professions and require that they be conducted with dignity and in a manner to avoid reproach. There is an unwritten code of ethics among honorable men which you will not violate, but while your vocation is beneficent and humanitarian in a large sense, it is also a business and must be so conducted as to bring a remuneration equal to a similar edu-

cation and ability in other occupations in your environment. You are entitled to fees that will maintain your social standing with the better class of your neighbors. You must get these fees by your recognized skill. You must obtain patients on your merits and not under any circumstances by offering or paying commissions to anyone whatsoever. Commissions offered to a professional brother mean bribery, detested by all honorable men. Commissions exacted are equivalent to the demand of the road agent of the plains—"stand and deliver." Commissions paid by you mean cowardice. You yield to a "blackmailer" under the threat of injury. You yield to the demand from your professional brother under the implied threat of a loss of bread and butter. It is nobler to go hungry than buy bread at the sacrifice of professional dignity and honor."

This question of commission-giving is not confined strictly to dental specialists; for it is known that some dentists, unworthy of the name, are giving commissions to druggists, starters in office buildings, etc., for referring patients. It is a sad commentary on the medical profession that many surgeons are splitting the fee for this same purpose. It is a still sadder commentary that many needless operations are performed because a liberal fee is in sight.

The local societies should take up this matter with all the energy at their command and erase this blot on the fair escutcheon of dentistry. Let us remember the words of an unknown author that "self-control, self-reliance and self-respect are three things that make a man a man."

Correspondence

EROSION INFORMATION WANTED.

Dear Editor:

I should like to hear of the methods used in various offices in the treatment of erosion and the success attendant thereon; and that I may not be asking something for nothing, I give here my own treatment for consideration.

For the past nine years I have used this method and have found it good, though painful. I have treated rather a large number of cases and in all have seemed to arrest the progress of the disease, though in one or two I have had to repeat the treatment in the course of time because of returning sensitiveness.

The method is as follows: The teeth are carefully polished and

cleaned and the gums and mucous membranes cleaned and massaged and the mouth made as nearly sterile as may be.

The dam is then placed and crowded as far up as possible to expose the entire eroded surface. The affected teeth are then freely bathed in hydrogen dioxid and the chemical dried into the tooth with a warm instrument. This is done to make use of both the cleansing and mechanical emptying properties of hydrogen dioxid, thus opening up and disinfecting the enlarged orifices of the tubili. After the agent is thoroughly dried, chloroform is freely used to wash away any fats that may be present and the tooth wiped dry. Then a stream of warm air is turned on till the tooth is dry. The tubuli now being as free from foreign substances as I can get them, 40 per cent formaldehyd solution is applied plentifully and dried into the tooth as thoroughly as can be done with hot instruments and hot air, a bit of paraffin placed on the affected spot and melted there with the hot instrument and the heat carried as high as the patient can stand, the object being to get the paraffin as deeply into the tubuli as possible. Treatment repeated six or eight times two or three days apart and the case dismissed with instructions to return at once should sensitiveness again develop.

I know of nothing better thus far, but would be glad to hear from others as to their methods, successes and failures.

3154 Indiana avenue, Chicago. LUCIEN H. ARNOLD, D.D.S.

Obituary.

H. S. ULSHOFFER, a prominent dentist of Denver, died July 3, 1908.

BELA ST. JOHN, 81 years old, a pioneer dentist of Torrington, Conn., died July 16, 1908.

W. W. FORD, 78 years old, formerly a leading dentist of Macon, Ga., died at Canton, July 7, 1908.

HERMAN GROSSMAN, 54 years old, a dentist of Chicago, died of heart disease, August 11, 1908.

J. S. ROBERTS, a dentist of Paris, Ill., died August 6, 1908.

J. H. CONVERSE, one of the oldest practicing dentists of Danville, Ill., died June 28, 1908.

HENRY C. WIDUP, 66 years old, a well-known retired dentist of Columbia City, Ind., died August 4, 1908.

W. H. REILLY, 67 years old, one of the oldest dentists in the state of Iowa, died July 17, 1908.

W. F. MORRILL, 83 years old, one of the best-known dentists of Southern Indiana, and at one time court dentist in Brazil, died at New Albany, July 13, 1908.

E. W. CROWE, 25 years old, a dentist of Baltimore, was drowned while bathing at Ocean City, August 2, 1908.

HARRY HERTIG, 39 years old, a dentist of Waynesburg, Pa., died from heart disease, July 11, 1908.

J. F. Griffith, 57 years old, one of the best-known dentists in North Carolina, died suddenly in Salisbury, July 16, 1908.

JOHN P. WILLIAMS, 46 years old, a dentist of Nashville, died from tuberculosis, July 20, 1908.

Notices.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

The annual session of the National Association of Dental Faculties was held in Boston, July 24, 25 and 27, 1908, and officers for the ensuing year were elected as follows: President, H. B. Tileston, Louisville; Vice-President, E. W. Branigan, Boston; Secretary, G. E. Hunt, Indianapolis; Treasurer, H. B. Jewett, Atlanta.

SOUTH DAKOTA DENTAL ASSOCIATION.

The twenty-sixth annual meeting of the South Dakota Dental Association was held in Lead, July 22, 23 and 24, 1908, and officers for the ensuing year were elected as follows: President, W. L. Neil, Deadwood; Vice-President, C. O. Jones, Huron; Secretary, Ferdinand Brown, Sioux Falls. The next meeting will be held in Huron.

CANADIAN DENTAL ASSOCIATION.

The fourth biennial meeting of the Canadian Dental Association was held in Ottawa, August 4, 5 and 6, 1908, and officers for the ensuing year were elected as follows: President, A. E. Webster, Toronto; Vice-President, W. D. Cowan, Regina; Secretary-Treasurer, J. G. A. Gendreault, Montreal.

NEW JERSEY STATE BOARD OF REGISTRATION AND EXAMINATION IN DENTISTRY.

The New Jersey State Board of Registration and Examination in Dentistry will hold their semiannual meeting to examine candidates for license in the Assembly Chamber of the State House at Trenton, N. J., beginning Monday, December 7, and continue through the 8th and 9th. Candidates must furnish professional and preliminary credentials and a photo-

graph or the application will not be accepted. Applications must be filed before the 3d of December. Practical operative work and practical prosthetic work completed the 7th. Applicants requested to furnish their patients for the practical operative work.

CHARLES A. MEEKER, Secy.,
29 Fulton St., Newark, N. J.

NORTHERN ILLINOIS DENTAL SOCIETY.

The twenty-first annual meeting of the Northern Illinois Dental Society will be held at Freeport, Oct. 21 and 22, 1908.

Mark the date in your appointment book and be sure and come for both days. The supervisor of clinics and program committee promise one of the best meetings of the society.

C. L. SMITH, Secy.,
St. Charles, Ill.

WISCONSIN DENTAL SOCIETY.

The thirty-eighth annual meeting of the Wisconsin State Dental Society was held in La Crosse, July 21, 22 and 23, 1908, and officers for the ensuing year were elected as follows: President, W. H. Mueller, Madison; 1st Vice-President, G. F. Hauser, La Crosse; 2d Vice-President, E. A. Geilfuss, Milwaukee; Secretary, H. N. Jackson, Milwaukee; Treasurer, Adolph Gropper, Milwaukee; Librarian, Harry Morton, Milwaukee. The next meeting will be held in Milwaukee.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

The annual session of the National Association of Dental Examiners was held in Boston, July 24, 25 and 27, 1908, and officers for the ensuing year were elected as follows: President, F. A. Shotwell, Rogersville, Tenn.; Vice-President for the South, S. Richard Wallace, Louisville, Ky.; Vice-President for the East, Albert L. Midgely, Providence, R. I.; Vice-President for the West, J. J. Wright, Milwaukee, Wis.; Secretary-Treasurer, Charles A. Meeker, Newark, N. J.

NATIONAL DENTAL ASSOCIATION.

The twelfth annual meeting of the National Dental Association was held in Boston, July 28-31, 1908, and officers for the ensuing year were elected as follows: President, V. E. Turner, Raleigh, N. C.; Vice-President for the East, Eugene H. Smith, Boston, Mass.; Vice-President for the South, William Crenshaw, Atlanta, Ga.; Vice-President for the West, W. T. Chambers, Denver, Colo.; Corresponding Secretary, H. C. Brown, Columbus, O.; Recording Secretary, C. S. Butler, Buffalo, N. Y.; Treasurer, A. R. Melendy, Knoxville, Tenn.; *Executive Council,* H. J. Burkhart, Batavia, N. Y.; J. Y. Crawford, Nashville, Tenn.; A. H. Peck, Chicago,

Ill.; F. O. Hetrick, Ottawa, Kan.; W. E. Boardman, Boston, Mass. The next meeting will be held in Birmingham, Ala.

NEW BRUNSWICK (CANADA) DENTAL SOCIETY.

The nineteenth annual meeting of the New Brunswick Dental Society was held in St. John, July 15, 1908, and officers for the ensuing year were elected as follows: President, J. J. Daly, Sussex; Vice-President, S. B. Smith, St. John; Secretary-Treasurer, F. A. Godsoe, St. John. The next meeting will be held in St. John.

VIRGINIA STATE DENTAL ASSOCIATION.

The thirty-ninth annual meeting of the Virginia State Dental Association was held in Richmond, July 14, 15 and 16, 1908, and officers for the ensuing year were elected as follows: President, F. A. Lee, Lynchburg; 1st Vice-President, E. J. Applewhite, Newport News; 2d Vice-President, F. W. Stiff, Richmond; 3d Vice-President, W. H. Mosely, South Boston; Recording Secretary, George F. Keesee, Richmond; Corresponding Secretary, W. H. Pearson, Hampton; Treasurer, W. M. Sturgis, Norfolk. The next meeting will be held in Chase City.

NEW JERSEY STATE DENTAL SOCIETY.

The thirty-eighth annual meeting of the New Jersey State Dental Society was held in Asbury Park, July 15, 16 and 17, 1908, and officers for the ensuing year were elected as follows: President, Frank G. Gregory, Newark; Vice-President, Charles H. Dilts, Trenton; Secretary, Charles A. Meeker, Newark; Asst. Secretary, Herbert S. Sutphen, Newark; Treasurer, Henry A. Hull, New Brunswick; *Executive Committee,* Charles H. Dilts, Trenton; Harvey Iredell, New Brunswick; Wallace F. Naylor, Somerville; Henry Fowler, Harrison; H. W. Hawke, Flemington. *Membership Committee,* W. T. Thompson, Asbury Park; Oscar Adelberg, Elizabeth; Thomas F. Martin, Rahway; Wm. P. Richards, Orange; G. M. Holden, Hackettstown.

MASSACHUSETTS BOARD OF REGISTRATION IN DENTISTRY.

A meeting of the Massachusetts Board of Registration in Dentistry, for the examination of candidates, will be held in Boston, Mass., October 28, 29, 30, 1908.

Candidates who have applied for examination will report to the secretary Wednesday, October 28, at 10 o'clock A. M., at Tufts College Dental Infirmary, corner Rogers and Huntington avenues, prepared with rubber-dam, gold, plastic filling materials and instruments, to demonstrate their skill in operative dentistry.

The theoretic examination—written—will include operative dentistry,

prosthetic dentistry, crown and bridge work, orthodontia, anatomy, histology, surgery, pathology, materia medica, therapeutics, physiology, bacteriology, anesthesia, chemistry and metallurgy, and will be held at Civil Service Rooms, State House, from Thursday, October 29, at 10 A. M., until Friday, P. M., October 30.

All applications, together with the fee of twenty dollars, if first examination, must be filed with the Secretary of the Board on or before October 21, 1908, as no application for this meeting will be received after that date.

Candidates for second and subsequent examinations will be required to fill out an application blank (Form 2) and forward to the secretary as above.

Every candidate for examination must be twenty-one years of age.

Application blanks may be obtained from the secretary.

Temporary licenses are never granted.

The fee for third and subsequent examination is $5.

G. E. MITCHELL, D.D.S., Secy.,
25 Merrimack St., Haverhill, Mass.

LATEST DENTAL PATENTS.

891,543. Dental tool, E. Y. Haughawout, Cedar Rapids, Neb.
891,600. Means for Attaching crowns to roots of teeth, C. A. Davis, Pasadena, Cal.
891,651. Dental tool, J. H. Abbott, Philadelphia, Pa.
891,689. Mold for making dental plates, J. W. Greene, Chillicothe, Ohio.
891,762. Dental chair, F. E. Case, Canton, Ohio.
892,040. Dental articulator, J. C. Fisher, New York, N. Y.
892,682. Mouth-prop, R. S. Price, Rochester, N. Y.
892,860. Chin support, C. J. Lewis, Kanawha, Iowa.
893,155. Dental bracket table, P. W. Evans, Washington, D. C.
893,345. Floss-holder attachment for toothbrushes, O. J. Monson, Chicago, Ill.
893,617. Artificial tooth, T. Flintoff, Claremont, Western Australia, Australia.
893,665. Dental-broach covering mechanism, R. Siegel, Cincinnati, Ohio.
895,293. Dental mirror, J. A. Wright and A. M. Nicodemus, Chicago, Ill.

News Summary.

COCAIN CASE.—One of the officers and two clerks of a prominent firm of wholesale druggists have been arrested on complaint of the Illinois State Board of Pharmacy, charged with selling cocain without a physician's

certificate or failure to keep a register of the cocain sold. The cases were continued.—*Journal American Medical Association.*

DECAYED TEETH IN APPENDICITIS.—Smith, in discussing the education of pupils in the public schools, with regard to the inculcation of hygiene of the mouth, suggests that there is good reason to believe that neglected teeth are largely responsible for the increase of appendicitis. He quotes in support of this opinion a statement of Sir Frederick Treves.—*Journal American Medical Association.*

KEEPING FLASKS CLEAN.—I notice every once in awhile some plan for keeping flasks clean. The following is the best method I have found: After vulcanizing scrape out all plaster which can be taken out easily with a knife, then put flasks in water and leave for two or three hours. Brush with stiff brush, if necessary; generally all that is needed is to turn the water on them. Fifteen years have I used this method and have never had to use a dirty flask.—A READER.

TOOTH ROOTS EXTEND INTO ANTRUM.—In examination of the antra of 600 skulls I found in quite a per cent, say 12 to 15, where the apices of the first and second molars came against the floor of the antrum, that there was nothing covering the apex of the tooth save the soft tissues and consequently when an abscess occurs at the roots of such teeth the discharge would naturally be into the antrum, that being the direction of least resistance.—M. H. FLETCHER, *Dental Summary.*

A BUSINESS FORECAST.—A doctor who posed as a bit of a wag stopped outside the yard of a stonemason one morning for a chat. "Good-morning. How's business?" said the doctor. "I suppose when you hear that someone is ill you get ready for eventualities, though, of course, you never go beyond the words, 'In memory of.'"

"Well, that all depends," replied the old chap; "you see, if you be a-doctoring of the patient I goes straight on."—*Exchange.*

STOVE POLISH FOR INLAYS.—The burning of fingers by the use of hydrofluoric acid makes me feel that this is an opportune time to remark that, instead of using an acid in cleaning the casts, I use carburet of iron, that is to say, the ordinary black stove polish; I take a small brush and apply the carburet of iron to my wax impression, and that gives me, on casting in a mold which has been allowed to cool, a cast cleaner than I can get with the subsequent use of any of the acids.—DR. NIES, *Items of Interest.*

DENTISTS AS MEDICAL SPECIALISTS.—Virginia dentists, through their state association, have launched a movement looking to their recognition as medical specialists. Vigorous reference to the present state of affairs was made in the annual address of the president, who declared that "the most remarkable fact recorded in the history of any branch of the healing art is that we, who have full charge of the oral cavity and the various diseases which manifest themselves there, have for more than a half cen-

tury remained content, or apparently so, to be classed as mechanics, or artisans, and as doctors only in name, while every other branch of the profession has been recognized as a legitimate specialty of medicine or surgery."

WATERED DENTISTS' BILLS.—Watered dentists' bills, just now the craze among the boasters of our fraternity, hardly seem a "square deal." It shows a commercial spirit antagonistic to accepted professional ideals; a commercial spirit very apt to dissolve the attachment supposed to exist between a satisfied patient and the dentist, and may later give the dentist an opportunity to go "fishing" for the wherewithal to live comfortably, and may finally end in a grave "marked only by daisies."—W. H. TRUEMAN, *Dental Brief.*

CARELESS USE OF BANDS AND LIGATURES IN REGULATING.—Many times lasting injury is done to the gum tissue from clamp bands that slip too far on the tooth, or which are not festooned at the cervical margins to prevent cutting into the gums. The foundation for future cases of pyorrhea may be laid in the use of ligatures that bury themselves in the gum entirely down to the alveolar process. Neither of these things is necessary, but may be avoided by careful and proper handling.—W. J. BRADY, *Western Dental Journal.*

DECORATION FOR CHIEF OF DENTAL EXAMINERS.—As soon as Dr. F. A. Shotwell of Rogersville, Tenn., had been elected president of the National Association of Dental Examiners, at the closing session of the National meeting, and escorted to the chair, an emblem consisting of a bar and pendant bearing enameled pictures of Bunker Hill Monument, Faneuil Hall, Paul Revere's lantern and a beanpot was presented to him by Dr. Dowsley in behalf of the Massachusetts Board of Examiners, and pinned upon his coat, amidst great applause.

DIAGNOSIS.—No one can properly treat a case without an understanding of what is really wrong. To diagnose an orthodontia case, take the models and study it all over, tooth by tooth. As you determine a tooth is out of place, study the effect of that misplacement upon the adjoining teeth. Note how each malposed tooth allows several others to drift from their places, and these in turn influence their antagonists in the opposite jaw. Study through the development of the entire denture, beginning with the first teeth erupted and following their progress, wrong or right, up to the present. Only such careful, painstaking study will ever show what is really wrong and what must really be corrected.—*Western Dental Journal.*

AMERICAN DENTIST TO KHEDIVE DEAD.—News was received in this city August 5 of the death in Marseilles, France, on July 16 of Dr. James Frederick Love, the American dentist to the Khedive of Egypt, after an operation for the removal of an abscess on the liver. Dr. Love bore the titles of pasha and sheik and was recognized in Egypt as no other foreigner ever was. He sprang into fame and favor during the bombardment of Alexandria by Admiral Seymour, of the British Navy, in 1882, which

marked the first great break in the revolutions headed by Arabi Pasha. Dr. Love's home was the Mecca for Europeans who sought shelter and protection, and he personally checked the excesses of the rioting mobs.—New York *Herald.*

SUICIDE.—William T. Neimi, a Finnish dentist, twenty-three years old, committed suicide August 4 at Duluth. No cause is assigned for the act, but it is supposed that he had become discouraged or was disappointed in love, or both.

JAW BROKEN BY DENTIST; DIES.—Charles Hyland, twenty-five years a member of the Terre Haute, Ind., police department and once its chief, died to-day from an abscess caused when a dentist broke his jaw extracting a tooth last fall.—*Chicago Tribune.*

A PUBLIC SCHOOL DENTAL INFIRMARY.—At a meeting of the Hartford Dental Society, Monday evening, a committee was appointed to see if funds could be secured to establish a dental infirmary for certain of our school children. This is the result of a conference with the Board of Health, school board and board of school principals and a study of the needs of the children. It is hoped and believed that when the matter is laid before the public, as it will be, many citizens will be ready to assist in establishing such an institution.—*Dental Brief.*

TWO PINS FOR BICUSPID CROWNS.—I could never bring myself to understand the advisability of using a double pin in a bicuspid—that is to say, a pin with both points of equal length. To insert that double pin in a bicuspid root it would be necessary to cut that bicuspid root in both directions to give ample space to put both ends in at the same time. That weakens the root; but if one pin is made considerably shorter than the other, you save a great deal of the tooth structure, and I think it is equally as strong.—DR. HAMLET, *Items of Interest.*

FINISHING THE POSTERIOR EDGE OF RUBBER DENTURES.—I think that a loose, ill-fitting denture may be responsible for the production of abnormal sounds. This may be overcome, of course, by making the heel of the plate sharp, not blunt. We often see vulcanized plates finished up with a very thick edge at the heel, and I have often wondered how an operator could put such a plate into a mouth. I always make the edge as sharp as possible, so that the air that passes along the palate will not meet with any interference or travel under the plate.—E. J. PERRY, *Dental Review.*

FATALITIES.—Rev. Daniel F. McGillicuddy of Worcester, Mass., died July 31 in Charlesgate Hospital, Cambridge. Death was the result of complications due to an abscessed tooth.—July 17, Mrs. Joseph H. Muenster, Austin, Tex., 24 years old, about to have a tooth extracted, died before an attempt was made to pull the tooth. Death was due to heart disease superinduced by fright.—Blood poisoning, resulting from an abscessed tooth which she had extracted six weeks before resulted in the death on June 27, of Mrs. H. R. Colby, aged fifty-five, of Beloit, Wis.—Mrs. John

Daly died in a dentist's chair in the office of her brother in Milwaukee, Wis., July 26, just after having been given chloroform to ease pain attending the removal of an abscessed tooth.

SPATULAS FOR SILICATES.—Since bone is much softer than a steel instrument, I cannot see why it should not come off, and I know it does come off, and lots of it, if used in mixing the silicates on the slab. I employ now exclusively an agate spatula. I have used ivory, which is a little harder than ordinary bone, and a great deal of it does come off. If I am putting in a silicate filling in the posterior part of the mouth I do not care about what spatula is employed at all. I do not think the use of steel instruments hurts it, except through a slight discoloration. I cannot understand why anyone wants to put in any cement, silicate, or any other soft material as a filling, until the fluid and the powder are thoroughly satisfied, and when you do that, you will get a pretty stiff mix. If you go over that point, and introduce too much powder, then, of course, you will have an imperfect filling, in the case of silicate, as with any other cement filling.—J. D. PATTERSON, *WYestern Dental Journal.*

A GOOD INVESTMENT MATERIAL.—The fact that the majority of dentists are taking up gold inlay work leads me to suggest that it would be a good thing for your journal to give them the components of an investment for same that could be heated to a red heat without cracking or changing form. I have been casting practically all my gold filling for the past two or three months and have used different investment materials, but the most perfect and sure results have been by using three parts of lithowhite to one part of plaster of Paris, well mixed and sifted.

Lithowhite is what is called XXX grade of silex and costs eight cents a pound in 10-pound cans, or six cents a pound in 50-pound cans. So you see it makes a very cheap article, and it is far better than most of the compounds sold.

I write this as I have tested it and have made my work easier, both for my patients and for myself, and I sincerely believe a good deal better and lasting work.—J. B. REEVES, *Dental Summary.*

ILLEGAL PRACTITIONERS.—A dentist of Los Angeles, Cal., was recently fined $30 for practicing without a license.—A dentist of Peoria, Ill., has been fined $50 and costs for practicing without a license.—A dentist of Grand Rapids, Mich., was fined $50 July 28 for practicing without a license.—A dentist of Bowling Green, O., the first man to be prosecuted under the new law regulating dentistry in the state of Ohio, for illegal practice, was fined $100 and costs June 29.—A dentist of La Grande, Ore., has been arrested the second time charged with practicing dentistry without a license. July 15 he was fined $50 on the same charge.—With every member of the State Board of Dental Examiners appearing against him, a dentist of Ogden, Ore., was convicted July 21, of practicing dentistry without a license. This was the sixth indictment. The previous cases all resulted in his favor. Considerable bitterness has been engendered by

the prosecutions, and it is understood the dentist is determined to fight his case through the courts of last resort.

To Protect the Gum When Polishing Labial or Buccal Fillings.—Trim a piece of orangewood to a thin wedge shape and use it as a gum retractor to hold the gum away when using a disk or stone, allowing the disk or stone to strike the wood instead of the gum.—A. J. Cottrell, *Dental Brief.*

Dry Flask and Cast Soon After Inlay is Invested.—Just as soon as the investment is sufficiently set, I put it right on the flame; of course, if you use a very hot flame, you will produce so much steaming in the investment that little pieces will flake off, it will explode; you should not heat it up too rapidly, but heat it up quickly, and make the casting without drying out on the sand bath, or waiting for the investment to dry out by standing. I used to think that if I could make the investment during the evening and allow it to stand over night, and do my casting the next morning, I was getting pretty good results, though I did have considerable cracking, but since I have worked along the other lines I have not had a single crack in the investment.—E. S. Gaylord, *Items of Interest.*

Devitalize in Pyorrhea?—I have always wanted to squirm when men advocated the removal of pulps in cases of pyorrhea, because the blood supply of the pulp robbed the pericemental membrane of sufficient blood supply. Anybody who has studied microscopic sections of the pericemental membrane would not have that idea, because he would see too many blood vessels going into the pericemental membrane from the bone all the way around the alveolar wall for the small number of the blood vessels given off from the pericemental membrane to the pulp to seriously interfere with the blood supply of the pericemental membrane. While I believe the removal of the pulp in cases of pyorrhea is a good thing in certain cases, it is not good for the reason I have mentioned.—F. B. Noyes, *Dental Review.*

Potassium Bitartrate for Dressing Wounds.—The Italians have been using since 1892 ordinary cream of tartar as a dressing for wounds. Lupo has published experiments which showed that a piece of meat could be kept intact for two months in a solution of potassium bitartrate. As a dressing for wounds it seems to inhibit bacterial growth, putrefaction and fermentations, while it stimulates granulation and cleanses the region, and is free from toxic action and odor. Mazzini adds to these virtues its efficacy in arresting necrotic processes in the bones and gangrenous processes, as it modifies conditions until the parts heal. It acts better when applied as a powder or on gauze, rather than in aqueous solutions, as water has an injurious influence on the tissues. The effect of the bitartrate is enhanced by alternating it with some other antiseptic or sterile dressing. He has used it on hundreds of soldiers with various affections and lesions and has always been pleased with the results, which he attributes mainly to the

liberation of nascent oxygen as the bitartrate comes in contact with the blood or local secretions.—*Journal American Medical Association.*

WOMAN SUES A DENTIST.—Elizabeth Wright entered suit August 7 against a dentist of Wilmerding, Pa., to recover $5,000 damages. She states that on November 2, 1906, he pulled a tooth for her, but did it so unskillfully that she suffered for several months and at times her life was in danger from continuous bleeding of the gums.

ROBBERIES.—Drs. Bliss, Byne and Gray, Santa Cruz, Cal., gold valued at $200, July 22.—Dr. C. H. Albrecht, Waukegan, Ill., gold solder, crowns and bridges, valued at $700, July 30.—Drs. Wills, Masters and Row, Connersville, Ind., gold valued at $30, in July.—Dr. H. F. Parr, Indianapolis, gold valued at $15, July 11.—Dr. E. B. Caldwell, Ann Arbor, gold fillings valued at $25, July 17.—Drs. Cruttenden, Alrick, Kelsey, Lasby, gold and supplies valued at $225, July 4.—Drs. Saunderson and Fletcher, Grand Forks, N. D., cash and gold plate to the value of $50.—Barrette Dental Co., Kansas City, gold and instruments valued at $50, July 9.—Dr. E. L. Sheldon, Easthampton, Mass., gold leaf valued at $50, in June.—Dr. W. H. Armstrong, Springfield, Mass., gold and platinum valued at $60, June 24.—Dr. J. L. 'Stanogle, Johnstown, Pa., instruments and gold valued at $70, July 21.

HOW TO MAKE AN ELECTRIC GOLD ANNEALER.—In making an electric gold annealer, the first thing to procure is a "heating unit," of a one-pint water heater, made by the General Electric Company. This is a flat, disk-shaped affair, about 3½ inches in diameter. The supply houses (General Electric) will usually sell this unit separately for about $1.50. Next procure an old alarm clock, the round, nickel-plated kind, of the larger size, say, about 4¾ inches in diameter. Get a sheet of mica, quite thin, and cut it to fit nicely within shell of alarm clock, which, by the way, is all of the clock you need, except the back. When you have placed the mica disk into the shell of the clock, it now occupies the same place that the glass front did. You then proceed to carefully place heat unit in close contact with the mica, introducing same from beneath so as to preclude disarrangement of coils of the heat unit. Now procure some sheet asbestos, made from the pads you can find in almost any hardware store—pads made to set upon the dining table, upon which to place hot dishes. With this cut into strips, you nicely fill up all space between heat-unit and case. Drill holes through side of case through which pass screws or wires, which will be necessary to hold heat-unit in firm contact with mica disk.

You now have an annealer that will work all right. If you wish to elaborate and make a more complete instrument, as the writer did, you first cut something from the height of case; this renders completed annealer more compact. To the side of case the writer attached a kind of hinge or swivel, through which a screw passes to fasten annealer to under surface of bracket table. When in use the annealer is rotated

out to a convenient position, and when work is finished it is turned until it is entirely under bracket table and out of the way. The back of the clock is slipped on bottom of the annealer also, to which binding posts are attached.

While the above annealer is not exactly "a thing of beauty," it is "a joy forever."—W. H. REABEN, *Dental Summary.*

USE NO VASELIN WITH SILICATES.—I want to express my disapprobation about using vaselin or cocoa butter or any oily substance like these upon the silicate cement before becoming hardened. I think that it will ruin the surface of your filling. I think the best covering is a rapid-setting varnish, such as the Harvard. To put vaselin or cocoa butter or anything of that kind upon the surface before the cement becomes hard will injure it. The manufacturers are wrong in suggesting this.—J. D. PATTERSON, *Western Dental Journal.*

TO PREVENT PHOSPHORUS NECROSIS.—New rules have been issued by the government regulating the manufacture of matches where yellow phosphorus is used, the old regulations being insufficient. The most important changes are as follows: No person under 17 years of age and no woman more than five months pregnant nor within six weeks after childbirth, is allowed to work on the premises. The factory hands must change their occupation at least every four weeks, so that they work alternately in the mixing department, the wood preparing department and the assorting department. Double doors must separate the departments, and the ventilation must be examined daily. Special suits of clothes, separate washing rooms and utensils for mouth rinsing must be at the disposal of the workers. Material for first aid as well as antidotes for acute poisoning must be ready at hand. A dentist, paid by the manufacturers, must regularly inspect the teeth of the factory hands. The number of cases of phosphorus necrosis reported during the decade 1895-1905 was 382 for the three largest Austrian factories.—*Journal Amer. Med. Assn.*

MARRIAGES.—Dan U. Cameron, a dentist of Chicago, was married to Miss Anna B. Doverspike of Kittanning, Pa., August 3.—M. J. Roth, a dentist of New Richmond, Ind., was married to Miss Anna P. Beck of Lafayette, Ind., July 2.—A. B. Parmenter, a dentist of Omaha, was married to Miss Alice Hemphill of Panora, Ia., July 25.—Roy Ott, a dentist of Fairfield, Ia., was married to Miss Mae McIntosh of Chicago, July 9.—John W. Robinson, a dentist of Auburn, Me., was married to Mrs. Margaret A. Blanchard, also of Auburn, July 28.—James R. White, a dentist of North Adams, Mass., was married to Miss Helen A. Browne of New London, Conn., July 23.—E. F. Museus, a dentist of Fessenden, N. D., was married to Miss Ada L. Clark of Hudson, Wis., June 30.—U. F. Clifton, a dentist of Fitchburg, Mass., was married to Miss Marjorie F. Skinner, also of Fitchburg, June 25.—Franklin P. Smith, a dentist of Allston, Mass., was married to Miss Lillian Bodwell of Lynn, July 20.—Leslie E. Stiles, a dentist of Custer City, Okla., was married to Miss

Amy Barnard of Durand, Mich., July 14.—John J. Werner, a dentist of Batavia, O., was married to Miss Carpenter of London, Ont., June 23.—S. F. Webert, a dentist of Stanley, Wis., was married to Miss Mabel McKenzie, also of Stanley, July 7. .

A LAY OPINION OF THE ROENTGEN RAYS.—According to the newspaper reports, an American physician, lately returned from abroad, tells the following story illustrating the vague idea some people still have of the nature of the Roentgen rays and the method of application: "A man wrote to a specialist: 'I have had a bullet in my thorax for eleven years. I am too busy to come to Berlin, but hope you will come down here with your rays, as my case should be worth your while. If you cannot come, send a packet of rays, with instructions as to use, and I will see if I cannot manage to work them myself.' The specialist replied: 'I am sorry that my engagements prevent my coming to see you and that I am out of rays just now. If you cannot come to Berlin yourself, send me your thorax by express and I will do the best I can with it.'"—*Journal American Medical Association.*

DEVITALIZING PASTE.—

℞ Arsenic trioxid 3j
Cocain .....gr. xx
Menthol .....gr. v
Lanolin, add q. s. to make a stiff paste.—M.

One ought to know something about compounding this prescription, otherwise it may not be satisfactory. Use as small an amount of lanolin as possible and still make a stiff paste with the other ingredients. The menthol is added largely for a pharmacal reason; it will take up the water in the lanolin and liquefy; the five grains of menthol, with a small amount of lanolin, will be sufficient to make a nice stiff paste out of the arsenic and the cocain. If too much lanolin is used, the paste will be too slow in action.—J. P. BUCKLEY, *Dental Register.*

BOY DIES; DENTIST IS HELD.—Stuart Hassler, four years old, 247 West Twenty-third street, died last evening after having four teeth extracted a few hours before, while under an anesthetic. The cause of his death is unknown and the police are holding "Doctor" James Fowler, who is a traveling dentist, pending an inquest.

Fowler, who is fifty-five years old, has a tent and runs a free show on a vacant lot at Twenty-third place and Leavitt street, where he has been entertaining crowds each evening and selling toothache remedies.

The boy's mother took him to Fowler yesterday to have the teeth extracted. According to the police Fowler had trouble in bringing the boy to consciousness after the anesthetic, but this is denied by Fowler. When the boy became conscious he was taken violently sick. Being unable to go home his mother took him to the home of a relative at 1095 Leavitt street, where he died two hours later.

Fowler denied that he was responsible for the boy's death. He denied

he had given him too much of the anesthetic or that he had trouble in reviving him. He said he was asked to give the boy something to make the operation painless, and did so.—*Chicago Record-Herald.*

HELP IN POLISHING AN INLAY.—It is a tedious process to hold an inlay, especially a small one, with the fingers while polishing. To overcome the difficulty, moisten a piece of cotton, place around the inlay and hold with the thumb and forefinger. The moist cotton not only protects the fingers from the heat of the stone, but keeps the stone wet, and aids materially in the polishing.—J. P. BUCKLEY, Chicago.

METHOD OF MAKING CAST GOLD TIPS.—In many cases we are called upon to restore the incisal third of a tooth having a vital pulp, the tooth structure being lost through traumatism, etc. I have found the following very gratifying to myself and patients:

With a fine grit carborundum stone, grind incisal of tooth until it is perfectly smooth and you have a square edge—no beveling—and thus outlining your filling as desired, preferably straight line mesiodistally, thus making a perfect tip. Take round bur size of 18 or 20 gauge platinum wire, drill holes, one mesially and one distally from pulp, one-sixteenth to one-eighth inch in depth. Slightly enlarge holes with fissure bur so as to permit easy insertion and withdrawal of wire, and cut pins from platinum wire proper length to securely cast into gold. Wax up tip, proper size and contour, remove with pins intact, invest and cast the same. Use pure gold in case of open bite, or 22-karat solder in edge to edge bite. Burnish and set, and you have complete restoration, without devitalization, which is very essential in young patients. I use the same method in opening the bite in bicuspids and molars, using one or two more pins and casting in 22-karat solder.—F. T. DALY, *Western Dental Jour.*

ESSENTIAL OIL WATER.—Many of the essential oils diluted with water and sprayed where needed may be usefully applied in dental practice. As the essential oils are all insoluble in water, the dilution must be brought about mechanically. The following process is directed in the last edition of the "Pharmacopœia of the United States:" Triturate two cubic centimeters of the oil with fifteen grammes of purified talc, add distilled water gradually, with continued trituration, to make one thousand cubic centimeters, filter through a well-wetted filter; repeat the filtering until the water is perfectly clear. In place of talc, any clean, insoluble substance may be used, such as calcium phosphate or magnesium carbonate. These medicated waters are intended to be as nearly as practicable saturated solutions; they may, however, be still further diluted for use. Oil of cinnamon, oil of peppermint, oil of wintergreen, etc., may be quickly prepared for use with a compressed air spray apparatus, by being thus diluted with distilled water, and their remedial virtues thoroughly and pleasantly utilized.—W. H. TRUEMAN, *Dental Brief.*

[The above is the proper way of making an essential oil water. This solution cannot be duplicated by simply "cutting" the oil with alcohol, as

many dentists suppose. As a spray in prophylaxis, etc., the efficiency of the medicated water is greatly increased by adding 5 or 10 per cent of alcohol.—Editor, DENTAL DIGEST.]

WAX SPRUES FOR MAKING VENT HOLES IN CASTING.—I formerly used plumbago mixed with plaster, but I found that it was not porous enough. It seems that a certain degree of porosity is desirable in an investment; that is, there must be some space into which the molten gold can push the air that is in the mold, the air that takes the place of the molten wax. I found too dense an investment would not work, although I did like that investment in the casting of full gold plates, where I was able to vent my casts. Full gold plates I have cast, using four sprues radiating from a common center; these sprues are all of resinous or sticky wax, which afterward melt out. I make them by simply rolling an ordinary piece of wax, and they act just as the metal sprues do, and then melt out. With these metal sprues it would be impossible to withdraw them. Numerous inlay fillings can be cast at once by this same method.—DR. NIES, *Items of Interest.*

THE EXPENSE OF THE GOLD CAST INLAY.—Have you ever considered the comparative cost of the cast gold inlay? It is by far the most expensive filling made. Owing to greater density, one-third to one-half more metal is used than by the former method of cohesion. It rarely occurs that a filling may be cast that does not require two dwt. of pure gold. Six to nine or even ten dwt. is not an unusual occurrence. Then, again, after a button has been used for two or three castings it becomes brittle and cannot be relied upon to flow properly. It must then be sold for scrap and fresh metal obtained. The method used by Dr. F. W. Low is as follows: Place in a small wax-lined receptacle the button that has been used. Cover with hydrofluoric acid for four or five minutes, then add as much pure gold as is to be used for the next inlay. Saltpeter and borax equal parts may be used. With this method the gold will not crystallize.—"HABEC," *Dental Practice.*

THE PERSONAL EQUATION AND AMALGAM.—My conclusion from years of observation is that in making an amalgam filling more depends upon the individual than the alloy. There is not one thing that the dentist does in which the personal factor enters into to the same extent as in making an amalgam filling. These mushy-mushy alloys, containing, perhaps, 55 per cent of tin as we mix them up, soft and manageable as a piece of very soft putty, ordinarily make a very poor filling, and yet there are some men who have been in practice, and who are still in practice, who make admirable fillings out of that material. I think, perhaps, the worst alloy that was ever extensively used in this country was the sterling alloy. I don't think we have ever had anything at all to compare with it in badness, in general use, and yet I have seen some very excellent fillings made with sterling alloy. There is a gentleman in the room to-day who made amalgam fillings, and they were put in the mouth of a patient who came back from

year to year, I suppose for five or six years in succession, and when he dropped out of observation those fillings were just as perfect in their adaptation to the walls of the cavity and in quality as when the operator left them. That is a clear case of making out of admittedly bad material a very excellent filling.—J. B. WILMOTT, *Dominion Dental Journal.*

BORIC ACID AND ITS QUALITIES.—Boric acid is a good thing; there is no doubt about it. It makes a splendid dusting powder; there are few, if any, better. Modify it as one may, give it an odor or a color to disguise it as one pleases, surround it with mystery or secrecy as one sees fit, it is still but boric acid with all its virtues—and limitations. Dissolved in water, it makes as good a mouth wash, as good an antiseptic solution as any of the high-priced, extravagantly advertised, antiseptic lotions on the market, of which it forms the chief and most important ingredient.—*Journal American Medical Association.*

MEDICINE AND DENTISTRY.—All the talk about the dental profession being a specialty of medicine and of the dentist being on a par with the physician makes good material for argument, but to me it seems that energy is wasted. There should not be any debate on the subject at all, that is, so far as determining the classification of the dental profession. The average dentist actually relieves more pain in a day than the average physician does in three days, and does not resort to the heart-depressing alkaloids to do it, either. But why not drop this claim about being a specialty of medicine, at least until we are enabled to procure 95 per cent phenol at the drug store without a physician's prescription?—E. C. THOMPSON, *Dental Review.*

[I am certain no pharmacist would refuse to sell a dentist 95 per cent phenol, cocain hydrochlorid or any other drug, if the dentist would write correctly a prescription for the same; at least this has been my experience.—Editor DENTAL DIGEST.]

GOOD ADVICE FOR ORTHODONTISTS AND OTHERS.—I want to impress upon you a few things as a father out of a father's experience. Start fair—begin right—don't take a second step until you are perfectly sure that your first is correct. Study your case from models as well as the oral cavity, but be sure that you have perfect models. Be sure of a good impression—no matter what material you use. Do not be guilty of the solecism of showing an imperfect cast and apologizing for it by saying that the impression was taken in a hurry. Be honest and own up that it was the best you could do.

Of all things, this step must not be hurried. Better none at all than a hurried, defective one. If your time will not permit, then postpone the sitting. Don't begin this most wonderful branch of technical scientific art with a false start. Let exactness be your dominating motive—exact in every step, and each succeeding one will be attained easier and the end a triumphant success. Except in the very simplest cases, make and keep good models of your cases, properly occluded and articulated. It

is better that you connect your casts at the heel either by a hinge or guide-pins, and thus preserve the occlusion from being bruised by handling.

Preserve with care for study and future reference the first casting from your impressions and be particular about the appearance of these models. Appearances go a long way to support assumptions. I think in times past my colleagues have been more impressed by the symmetry of my models than by all my talk. Talk is cheap—anybody can talk, but it is not everybody who shows neat, carefully prepared, artistic models. —Norman W. Kingsley, *American Orthodontist.*

Mixing Investment for Inlays.—I think the investment and the mixing of the investment is very important; and I know that Dr. Taggart makes the claim that, as nearly as possible, exact methods should be used in managing this investment, to which end he has designed a double-ended ladle, one end of which will contain the proper quantity of investment and the other end a proper quantity of water, and you will find that if you mix Taggart's investment in that proportion, you will have a very stiff mixture. Those of us who handle cement know oxyphosphate mixed thin is a cement; mixed thick it is a filling material. In other words, if you want strength, durability and density, you must put more material with your liquid. And so it must be with this investment material, and Dr. Taggart puts his investment over the fire and finishes the whole work as quickly as possible. Not only that, but in his flask ring he has a hole drilled, and after the ring is filled he turns it upside down and presses against the investment material, so that the water oozes out and the investment is made more dense.—R. Ottolengui, *Items of Interest.*

The X-ray and the Ultra-violet Ray in the Treatment of Facial Neuralgia.—The first thing in such a case is to make a complete X-ray examination. This may reveal an entirely unsuspected, and, as in several of the author's cases, a removable cause, and one which if not removed will cause every sort of treatment to fail. An unerupted tooth will sometimes be found, and a chronic inflammation of the antrum is the cause in other cases.

In the absence of any demonstrable lesion, the treatment of an individual case of inferior dental neuralgia, for instance, would consist in repeated mild applications of the X-ray from the outside of the face and limited to the region of the lower jaw by a shield and diaphragm; and the ultra-violet ray vacuum electrodes applied to the outside of the face and also to the gums in the affected region. The applications are made three times a week for about three weeks and are so mild as not to cause the beard to fall out. The result is usually a cure, though this may not be manifest until some time after the course of treatment is all over. The effect is not one of temporary stimulation, but of permanent tissue changes.

Another class of cases includes one now under treatment in which a resection of the inferior dental nerve was followed in about six months

by recurrence of the attacks of tic douloureux and in which the author is making X-ray applications with a view to destroying the newly formed bridge of nerve tissue between the divided ends of the nerve. The applications are made both from the outside and from the inside of the mouth and are more severe.—Dr. Sinclair Tousey, *Dental Brief.*

Dangers of Hydrofluoric Acid.—In connection with making gold inlays I want to give you one little note of warning, which I hope none of you will ever need. Dr. Taggart recommended to us hydrofluoric acid for cleaning the gold, and, to my surprise, I learned today that that is exactly what is used for cleaning the castings of iron and steel. Workmen in foundries have learned to use it much diluted and to wear rubber gloves. Of course, I have always known it was a dangerous thing to handle, and I supposed I was doing so with the greatest caution, but I found in a short time all the glassware in my laboratory was being ruined; glasses not nearer than four or five feet were clouded by the hydrofluoric fumes. Recently I injured myself with it, and have been unable to do any work requiring the use of any force whatever since that time, and I dwell on this because all of the acid that reached my finger was by touching the cork; yet that tiny drop getting under the nail caused me intense pain, the wound requiring nine weeks to heal.—R. Ottolengul, *Items of Interest.*

Examining Board Affairs.—At the June meeting of the Massachusetts Board 92 out of 147 candidates were successful in passing the examination. —At the June meeting of the Montana Board 11 out of 12 passed.—At the June meeting of the North Carolina Board 39 out of 42 passed.—At the June meeting of the Pennsylvania Board 176 out of 212 passed.—At the June meeting of the Utah Board 15 out of 18 passed.—The State Supreme Court of Washington July 16 affirmed the decision of the Spokane Superior Court, appointing a receiver for the State Board of Dental Examiners to compel that board to pay Sam R. Stern $1,400 for legal services he performed for the board in prosecuting dentists who advertised and who had no license.—At the National meeting in Boston Dr. Frank O. Hetrick of Ottawa, Kan., emphasized the need of a unification and strengthening of the dental laws of the different states, to the end that the profession may attain a higher and uniform standard of qualification. "When the body was called into being 26 years ago," he said, "the first dental laws had but recently passed, and are yet but in an experimental stage. In the meantime we have changed our position so often that we have almost contracted spinal curvature, and there is a spirit of unrest in the different dental organizations, due to a realization of our failure to measure up to the highest ideals of the standard of attainment."—At this meeting also an important part of the business was the consideration of the report of the committee of both organizations—the dental faculties and the dental examiners—on the tabulations, going on for five years, on the percentage of graduates of the various dental schools that have successfully passed the examining boards. The impor-

tance of this report lies in the fact that it is proposed to discredit any dental school 50 per cent of whose graduates have failed to pass such examinations in this period.

DENTISTS IN ILLINOIS STATE CHARITABLE INSTITUTIONS.—Since the last meeting of the Illinois State Dental Society some of the state institutions, under arrangements with the State Board of Charities and the Civil Service Commission, have had dental surgeons appointed, after a competitive examination, conducted by the Civil Service Commission, which was held in order to determine the relative ability and capacity of the several candidates. These appointments carry with them compensation which is ridiculously small, but it has been explained to your committee that this financial arrangement is so small because the entire question is in the experimental stage. Your committee feels that the gentlemen who have entered upon this field as pioneers and have accepted these positions with the small pecuniary remuneration are entitled to a great deal of credit on the part of the profession.—C. R. E. KOCH, *Dental Review.*

IT PAYS TO BE HONOR-BRIGHT.—Let me say this, that the manufacturer who gets out an absolutely honest product and publishes his formula need not be afraid the profession are going to steal it. The man who is honor-bright with the profession will be sustained by the profession every time; and the first man who comes out and gives the detailed manufacture of an alloy and the correct proportions in that alloy and publishes it to the profession will make a fortune out of that alloy if it is a good one. The manufacturers and the profession should get closer together and have a different relationship one with the other. The profession will meet them half way every time just as soon as the manufacturers have confidence in the dentists; but in the past they have published methods of manipulating their products that have been misleading and done more harm than good.—C. N. JOHNSON, *Dominion Dental Jour.*

RADIOTHERAPY IN DENTISTRY.—The X-ray has an undoubted beneficial effect in cancer, but it is seldom wise to recommend it to the exclusion of surgery, except in inoperable cases about the mouth. In most cases only a few days should be devoted to X-ray treatment, with a view to prophylaxis. It tends to prevent constitutional involvement by local obliteration of lymphatic channels. Then the cancer should be removed as thoroughly as possible by the surgeon. A course of X-ray treatments should be instituted as soon as possible after the operation, even before the wound has healed. This treatment may consist in mild applications of one Holzknecht unit of No. 6 rays three times a week for three weeks, over twice as large an area as is known to be affected. Then a period of absence for two months, followed by another three weeks' course of treatment. Four mild courses of treatment should be given in the first year after operation, providing that no recurrence takes place.—DR. SINCLAIR TOUSEY, *Dental Brief.*